CURRENT

EMERGENCY PLAN

IMPLEMENTING PROCEDURES

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Volume 3A

05/21/84

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05/21/84

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER EP OP-0
REVISION 6
DATE 4/12/84
PAGE 1 OF 20

TITLE EMERGENCY OPERATING PROCEDURE
REACTOR TRIP WITH SAFETY INJECTION

IMPORTANT TO SAFETY

APPROVED [signature] 4/20/84
PLANT MANAGER DATE

SCOPE

This procedure covers the initial operating steps to be taken in the event of a reactor trip with safety injection signal. The safety injection signal may occur at some time after the reactor trip has taken place. If this is the case, the operator will cease using OP-5 (Reactor Trip Without Safety Injection) procedure and will use this procedure to control and analyze the plant condition. This procedure and changes thereto require PSRC review.

SYMPTOMS[1]

The following symptoms are typical of those which may arise in a plant which is undergoing a loss of reactor coolant, loss of secondary coolant or steam generator tube rupture (one or more symptoms in each category may appear in any order)[2]:

LOSS OR REACTOR COOLANT

Lo Pressurizer Pressure

Lo Pressurizer Water Level

Hi Pressurizer Water Level

Letdown Isolation/Pressurizer Heater Cutout

Increased Charging Flow

Hi Containment Pressure

Hi Containment Temperature

Hi Containment Humidity

Hi Containment Radiation

Hi Containment Recirc. Sump Water Level

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[1]The process variables referred to in this Instruction are typically monitored by more than one instrumentation channel. The redundant channels should be checked for consistency while performing the steps of this Instruction.

[2]The pressurizer water level indication should always be used in conjunction with other specified reactor coolant system indications to evaluate system response and to initiate manual operator actions.

LOSS OF SECONDARY COOLANT

Lo Pressurizer Pressure

Lo Pressurizer Water Level

Letdown Isolation/Pressurizer Heater Cutout

Lo-Lo Reactor Coolant Tavg

Hi Containment Pressure

Hi Containment Temperature

Hi Containment Recirc. Sump Level

Steam Flow/Feedwater Flow Mismatch

Lo Steam Line Pressure (one or all Steam Lines)

Lo Steam Generator Water Level

Hi Steam Flow (one or all Steam Lines)

Lo Feedwater Pump Discharge Pressure

STEAM GENERATOR TUBE RUPTURE

Hi Air Ejector Radiation

Lo Pressurizer Pressure

Lo Pressurizer Water Level

Increasing Charging Flow

Letdown Isolation/Pressurizer Heater Cutout

Steam Flow/Feed Flow Mismatch

Hi Steam Generator Blowdown Radiation

Increasing Stem Generator Water Level

AUTOMATIC ACTIONS

1. Reactor trip and turbine trip.
2. Safety injection initiated.

OBJECTIVES

1. To verify the reactor trip and safety injection.

NOTE: If the plant is in a condition which warrants a reactor trip and safety injection and an automatic reactor trip and safety injection has not yet occurred, it is the reactor operators responsibility to manually initiate the reactor trip and safety injection.

2. To verify all SI equipment is operating and performing the intended function.

3. To monitor plant parameters and diagnose the initiating SI signal.

4. To mitigate the consequences of a valid SI signal by providing direction once the initiating signal is identified.

IMMEDIATE OPERATOR ACTIONS

ACTION	COMMENTS
1. Verify the following automatic actions. If required, use manual control to satisfy the action.	
a. Reactor trip (all rods on bottom, DRPI - Nuclear Instruments Decreasing.)	
b. Turbine trip (all four SV closed on EH panel.)	
c. Vital 4160 busses F, G and H transferred to startup power (breaker positions on VB-4.)	
d. Vital 4160 busses F, G and H voltage normal (120 volts indicated on 480 volt vital busses F, G and H, VB-4.)	
e. Diesel generators running and voltage normal (diesel RPM and generator voltmeter on VB-4.)	
f. Auxiliary building ventilation system in building and safeguards mode (mode light on ventilation section of VB-4).	
g. Control room ventilation system in mode 4 (mode light on VB-4).	
h. Both motor driven auxiliary feedwater pumps running and all 4 auxiliary feedwater LCV open. (Motor breaker position lights and LCV position indicators on VP-3).	

ACTION	COMMENTS
i. Check the safeguards postage stamp monitor lights on VB-1.	
IF 2 steam loops have Hi steam flow in alarm with any 2 loop Lo pressure in alarm OR 2 steam loops have Hi steam flow in alarm with any 2 loop Lo-Lo Tavg in alarm THEN: Verify all 4 main steam isolation valves, bypass valves and all 4 steam generator blowdown stop valves IC closed (valve position indication lights on VB-3).	
j. ALL ECCS pumps have started and automatic valve operations have occurred (all SI/FW ISOL/STM GEN LEVEL postage stamp monitor lights on VB-1 not in alarm).	j. Verify minimum of one ECCS train operating (SI, charging and RHR pump).
k. Containment Phase A and containment ventilation isolation (all containment Phase A postage stamp monitor lights on VB-1 not in alarm).	

SUBSEQUENT OPERATOR ACTIONS (PART A)

1. Verify the following pump flows.

   If the flows are not occurring, attempt to operate equipment manually or locally to establish the flows.

ACTION	COMMENTS
a. Minimum of one safety injection pump running with flow indicated when W.R. RCS pressure is less than the SI pump shutoff head (1465 psig). (VB-1)	a. NOTE: If W.R. RCS pressure is greater than the shutoff head of the SI pump, continue on with this procedure to monitor W.R. RCS pressure and verify SI pump flow if pressure drops below the shutoff head of the SI pump.
b. Minimum of one charging pump running with flow via BIT indicated on FI 917. (VB-2)	
c. Verify both motor driven AFP running and flow indicated, to all 4 steam generators (VB-3),	
OR Start the steam driven AFP by opening FCV 95 and establish flow to all 4 steam generators (VB-3).	
Maintain maximum AFW flow until the steam generator water levels are in the narrow range. When the SG water levels approach 33% NR, verify automatic steam generator level control.	c. Automatic Steam Generator level control only applies to motor driven AFP's.
d. Verify RCS heat removal by	d. Atmospheric steam dump will be blocked by an existing "Turbine Tripped" condition. If condenser steam dump has been blocked due to a control malfunction or loss of the "Condenser Available" condition, decay heat removal will be effected by automatic actuation of the steam generator 10% atmospheric steam dump valves, or if
1) Observing automatic dump to condenser or atmospheric steam dump via the 10% steam dump valves (VB-3).	
AND 2) RCS Tavg decreasing to no-load temperature 547°F (VB-2)	

ACTION	COMMENTS
	these prove ineffective, the steam generator code safety valves. In this event, steam pressure will be maintained at the set pressure of the controlling valve(s) and reactor coolant average temperature will stabilize at approximately the saturation temperature for the steam pressure being maintained.
2. Monitor containment pressure (VB-1), if containment pressure reaches or exceeds 22 psig, verify the following actions. If required, use manual control to satisfy the action.	
a. Main Steam Isolation Valves and Bypass Valves closed. Phase B isolation postage stamp monitor lights not in alarm (VB-1).	
b. Steam Generator Blowdown Valves IC closed. Phase B isolation postage stamp monitor lights not in alarm (VB-1).	
c. Containment spray initiated (phase B isolation postage stamp monitor lights not in alarm VB-1).	
d. Phase B isolation (phase B isolation postage stamp monitor lights not in alarm VB-1).	
e. Manually trip all 4 RCP's.	e. CCW to the lube oil coolers will be lost on the phase B isolation.
3. Monitor the core exit thermocouple temperatures for indications of inadequate core cooling. If indications of inadequate core cooling exist, perform Appendix B of this procedure.	

SUBSEQUENT OPERATOR ACTIONS (PART B)

ACCIDENT DIAGNOSTICS

1. Evaluate RCS pressure:

   a. If W.R. RCS pressure falls below or is below 1950 psig, close or verify closed the following valves.

      Pressurizer Spray Valve PCV 455A
      Pressurizer Spray Valve PCV 455B
      Auxiliary Spray Valves 8145 and 8148
      Pressurizer Power Relief Valve PCV 474
      Pressurizer Power Relief Valve PCV 456
      Pressurizer Power Relief Valve PCV 455C

   a. Verify closed by observing position indication lights and discharge pipe temperature indicators.

   b. If W.R. RCS pressure remains above 1950 psig and is stable or increasing, go to Step 1 of Part C Subsequent Operator Actions.

2. If W.R.RCS pressure continues to decay below 1220 psig or is below 1220 psig and stable.

2. NOTE: The conditions for stopping RCP must be continuosly monitored throughout the transient.

   a. Again verify a minimum of one charging pump delivering flow and one SI pump delivering flow to the RCS

   a. SI flow rate will increase with decreasing RCS pressure.

   b. Then, STOP all four reactor coolant pumps. Maintain seal water flow to the RCP seals.

   c. Close the centrifugal charging pump recirculation valves, 8105 and 8106.

   c. NOTE: When the W.R. RCS pressure is restored above 2000 psig, reopen valves 8105 and 8106 to prevent pump damage.

   d. If component cooling water to the RCP's is isolated due to a containment phase B isolation, stop all RCP's within 5 minutes and maintain seal flow as above.

SUBSEQUENT OPERATOR ACTIONS (PART C)

ACTION	COMMENTS
1. Assume the event is NON SPURIOUS safety injection until all of the following items are verified NORMAL.	1. This step is entered from Accident Diagnostics step 1 b.
a. Containment pressure.	
b. Containment temperature	
c. Containment recirc. sump level.	
d. Containment area radiation monitor.	
e. Condenser air ejector radiation.	
f. Auxiliary Bldg. control board area radiation.	
g. Reciprocal charging pump room area radiation.	
h. Plant ventilation particulate monitor.	
i. Plant ventilation radio gas monitor.	
If the above items a. through i. cannot be verified NORMAL, return to step 1 of Accident Diagnostics.	
If the above symptoms a. through i. are normal, and when	
j. W.R. RCS pressure is greater 2000 psig.	
NOTE On spurious SI recovery, if RCS pressure decreased below the shutoff head of the SI pumps (1520 PSIG) during the transient, perform leak test (STP V-5) within 24 hours following the ECCS actuation on those valves listed in Table 3.4-1 of Tech Spec 4.4.6.2.2 which actuated or if there was flow through the valve.	
AND k. Pressurizer water level is greater than 22%.	
AND l. RCS indicated subcooling is greater than 35°F.	1. If the RCS subcooling meter is inoperable or is suspected to be incorrect, use wide range Thot in conjunction with the attached RCS saturation curve (graph) to determine RCS subcooling.

ACTION	COMMENTS
3. If condenser air ejector radiation monitor is reading abnormally <u>high</u> radiation <u>AND</u> containment pressure, containment area radiation monitor, and containment recirc. sump level exhibit <u>NORMAL</u> readings, discontinue this procedure and begin procedure OP-3A, Steam Generator Tube Rupture.	
4. If steam generator pressure is ABNORMALLY <u>LOW</u> in one steam generator as compared to the other steam generators, discontinue this procedure and begin procedure OP-2, Loss of Secondary Coolant.	4. This is indicative of a secondary break upstream of MSIV.
5. If containment pressure, containment area radiation monitor, or containment recirc. sump level exhibit ABNORMALLY <u>HIGH</u> or <u>INCREASING</u> levels, discontinue this procedure and begin procedure OP-1, Loss of Reactor Coolant.	5. <u>NOTE</u>: For very small coolant breaks inside the containment, the containment pressure and containment recirc. sump level may increase very slowly and possibly not recognizable by the operator immediately. Therefore, the operator should monitor these parameters throughout the transient.
6. If containment pressure, containment area radiation monitor and containment recirc. sump level remains stable in the <u>pre-event range</u>, discontinue this procedure and begin procedure OP-2, Loss of Secondary Coolant.	6. This is indicative of a secondary break downstream of MSIV.

ACTION	COMMENTS
3. Verify the following:	
a. With normal RCS charging, the pressurizer water level remains above 10%.	
b. W.R. RCS pressure remains above 1850 psig.	
c. RCS indicated subcooling greater than 35°F.	c. CAUTION: Stopping and starting of the ECCS pumps can cause pump motor overheating or reduced motor life.
If item a., b., or c. above cannot be verified MANUALLY, REINITIATE SAFETY INJECTION and return to diagnostic Step 1, subsequent action Part "B", of this procedure. If the ECCS pumps are restarted, add 15°F to item c. above.	
4. Verify auxiliary feedwater flow and steam generator water levels approaching NO LOAD level (33% narrow range).	
5. Establish normal letdown.	
a. Check open or open letdown valves LCV-459 and 460.	
b. Open letdown isolation valve 8152.	
c. Open one 75 gpm letdown orifice valve.	
d. Verify PCV-135 opening by observing letdown flow.	
6. Establish VCT makeup and transfer charging pumps suction to VCT.	
a. Adjust VCT makeup blend to the existing boron concentration.	
b. Open VCT outlet valves LCV-112B and C.	
c. Close RWST to charging pump suction valves 8805A and B.	
d. Verify divert valve LCV-112A in AUTO.	
e. Verify charging flow normal.	

ACTION	COMMENTS
AND m. Auxiliary feedwater flow to each steam generator is greater than 205 gpm or One steam generator wide range water level instrument indicates a level greater than 75%.	
THEN	
2. Reset safety injection.	2. CAUTION: 1) Automatic reinitiation of safety injection will not occur after this step since the reactor trip breakers are open. If the operator has indication that an SI is required after this step, he must initiate it manually. CAUTION: 2) If loss of off-site power occurs after resetting safety injection, it will be necessary to load the safeguards equipment onto the vital busses manually. If safety injection is reinitiated manually after the loss of off-site power the vital busses will automatically sequentially load the safeguard equipment. If manual loading or automatic loading is performed, verify the equipment given in Appendix A is loaded onto the vital busses.
a. Reset containment isolation phase A, train A and train B.	
b. Stop one charging pump at a time and evaluate RCS pressure. Maintain sufficient charging flow to supply adequate seal injection flow and to prevent RCS pressure from decaying. If RCS pressure drops below 1850 psig,	

ACTION	COMMENT
7. If RCP's are not running, establish conditions for starting RCP's and start at least one RCP.	7. Start RCP 1 or 2 if possible to provide Pressurizer Spray capability.
8. With pressurizer level controlled in manual, verify pressurizer pressure control in AUTO and pressurizer sprays and heaters controlling pressure.	
9. Stop all 3 diesel generators, place diesel generator control switches in AUTO.	
10. Insure the main and feedpump turbines on turning gear once 0 RPM speed is reached.	
11. IF after securing safety injection and transferring the plant to normal pressurizer pressure and level control, the reactor coolant pressure does not drop below the low pressurizer pressure setpoint for safety injection actuation AND the pressurizer water level remains above 10%, AND the reactor coolant indicated subcooling is greater than 35°F, then consider the event a spurious safety injection. Continue to monitor these parameters closely; if any parameter fails to remain above the limit, manually reinitiate Safety Injection and return to Step 1 of the Diagnostic section.	11. CAUTION: Do not reset the reactor trip breakers until authorized by the Plant Superintendent.

SPURIOUS SI SIGNAL RECOVERY

1. Proceed to a normal Hot Standby condition as follows:

   a. If steam line isolation has occurred:

      1) Close or check closed all 35 and 40% steam dump valves.

      2) Prepare or verify main condenser available for service.

      3) Equalize or attempt to equalize and open all 4 MSIV's. Monitor steam generator pressure closely during this operation. Immediately close all MSIV's if steam pressure rapidly drops during this operation.

         3) A steam line break downstream of MSIV's will prevent equalizing.

      4) Establish steam dump to condenser using steam pressure mode set at 1005 psig.

ACTION	COMMENTS
reinitiate SI and return to Step 1 of the diagnostics.	
c. Stop both RHR and SI pumps.	
d. Verify AC turbine bearing oil pump and Hi pressure seal oil backup pump running after oil pressure decays to 11 psig and turbine bearing lift pump starts at 600 RPM turbine speed.	
e. Establish normal charging.	
1) Open instrument air valves FCV-584 and 682.	
2) Check open or open normal charging valve 8146.	
3) Check close or close charging to auxiliary spray valves 8145 and 8148 and alternate charging valve 8147.	
4) Open charging line isolation valves MO 8107 and 8108.	
5) Adjust HCV-142 and FCV-128 or reciprocal charging pump speed to achieve RCP seal flow and charging flow as required to maintain pressurizer level greater than 22%.	
6) Open RCP seal return valves MO 8100 and 8112. Check RCP seal return flow normal.	
7) Close the BIT inlet and outlet valves 8803A and B, 8801A and B.	

ACTION

COMMENTS

1) Open containment rad. Gas monitor valves FCV-681, 678 and 679.

2) Verify normal readings on containment air particulate and radio gas monitors on RMS board.

h. Reset radwaste isolation valves reset switches.

i. Open fire water valve FCV-633 and primary water to containment valve 8029.

j. Open valve 8045 N_2 to PRT.

k. If the incore chiller has been in service prior to the SI, open incore chiller valves FCV 655, 657, 654 and 656.

l. If the gross failed fuel detector has been in service prior to the SI, open Hot Leg sample valves 9356A and B.

1) Verify flow returns on the GFFD flowmeter.

2) Verify the GFFD countrate returns on scale and stabilizes at a value below the post SI countrate on the recorder.

m. Open the pressurizer steam space sample valves 9354A and B

n. Open pressurizer relief tank gas analyzer valve 8034A.

2. Maintain Hot Standby conditions until authorized to proceed with a normal startup or inform the plant superintendent that the unit is proceeding to Cold Shutdown.

ACTION	COMMENTS
5) If steam dump to the condenser is established, verify all atmospheric steam dump valves closed.	
b. Open the main generator motor operated disconnect switch and reenergize the unit auxiliary transformers by back-feeding from the 500 KV yard. Transfer all station auxiliary busses (12 and 4 KV busses) to the unit auxiliary transformers.	
c. Return the auxiliary building ventilation system to normal by resetting the "S" signal on both POV cabinets and selecting building only mode on VB-3.	
d. Reset both Units 1 and 2 control room ventilation systems on Unit 2 radiation control board and verify both Units 1 and 2 ventilation systems return to the normal mode of operation.	
e. When directed by the SFM, shutdown the following:	
1) One auxiliary saltwater pump.	
2) Steam driven auxiliary feedwater pump after steam generator levels are greater than 33% and motor driven pumps are controlling level.	
3) Close CFCU maxi flow valves then shutdown 1 CCW pump.	
4) Remove 2 CFCU's from service and place the running CFCU's on fast speed.	
f. Flush BIT outlet to cold leg injection lines for approximately 20 minutes by opening SI-1-8969. Drain and refill the BIT using OP B-1C; IV Restoring Boron Injection Tank After Safety Injection.	
g. Reset containment ventilation isolation trains A and train B.	

APPENDIX A

BLACKOUT WITH SAFETY INJECTION EMERGENCY LOADING OF VITAL BUSSES

1. If the vital busses lose voltage prior to resetting the safety injection signal, the vital busses will automatically load the vital equipment given below. Verify the equipment has been loaded by observing breaker lights on the control board.

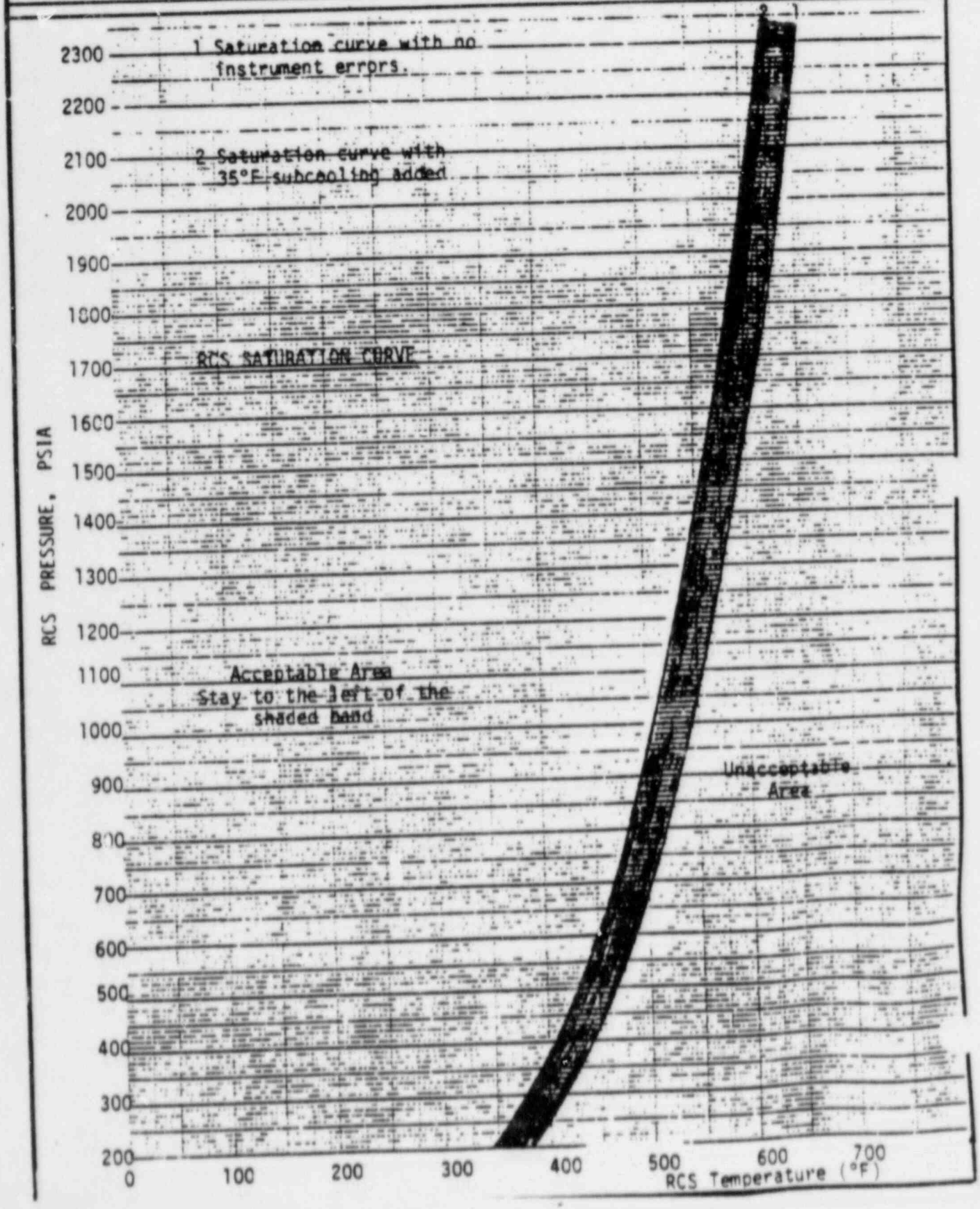
2. If the vital busses lose voltage after the safety injection signal has been reset, load or verify loaded the equipment given below onto the vital busses manually. Allow approximately 4 seconds between loading of each piece of equipment onto a given vital bus. Load or verify that the CFCU are running in Low Speed.

VITAL BUS F	VITAL BUS G	VITAL BUS H
D/G 1-3	D/G 1-2	D/G 1-1
MCC 1-F	MCC 1-G	MCC 1-H
CC Pp 1-1	CC Pp 1-2	SI Pp 1-2
SI Pp 1-1		
CFCU 1-2	RHR Pp 1-1	RHR Pp 1-2
CFCU 1-1	CFCU 1-3	CFCU 1-4
CCW Pp 1-1	CFCU 1-5	CCW Pp 1-3
ASW Pp 1-1	CCW Pp 1-2	AFW Pp 1-2
AFW Pp 1-3	ASW Pp 1-2	

3. Load the containment spray Pumps only if they were running prior to the blackout.

VITAL BUS G	VITAL BUS H
Cont Spray Pp 1-1	Cont Spray Pp 1-2

TITLE: REACTOR TRIP WITH SAFETY INJECTION



APPENDIX B (Cont.)

ACTION	COMMENTS
a. Declare a General Emergency Implement the instructions given in Emergency Procedure G-1 regarding on and off-site protective actions.	
b. Attempt to establish SI flow to the RCS and AFW flow to the steam Generators.	
c. Continue monitoring core outlet temperature to determine the effectiveness of the remaining actions.	
d. DEPRESSURIZE THE RCS by method 1 or 2 below.	
1) Dump steam to the condenser or atmosphere if the steam generator levels are in the narrow range and AFW flow is evident.	1) THIS IS THE PREFERRED METHOD.
2) Verify the SIS or charging pumps are running and available to deliver water to the RCS. THEN Open the pressurizer PORV's.	2) Opening the PORV's will provide a drop in RCS pressure sufficient to allow the SI flow required to cool the core. This method is to be used only if 1) (above) is ineffective.
e. If no means of depressurization are available, or if the depressurization did not result in decreasing core exit thermocouple temperatures, THEN START one RCP if possible. If the RCP fails after starting, replace the lost RCP with any remaining RCP.	e. Attempt to establish CCW and seal water flow to the pump; however, if CCW and/or seal water flow cannot be established, proceed to start a RCP. The pump must be started to move coolant thru the core.

APPENDIX B

DETERMINATION OF ADEQUATE CORE COOLING

This appendix provides the guidance to determine adequate core cooling if inadequate core cooling is suspected. Further, the instructions for regaining adequate core cooling are presented.

ACTION	COMMENTS
1. Monitor the core exit thermocouple temperatures. a. If the P-250 is available go to step 2. b. If the P-250 is not available go to step 3.	
2. If 5 or more P-250 thermocouple readings exceed 1200°F, notify the Shift Foreman that inadequate core cooling exists and go to step 5. If there are not 5 or more that exceed 1200°F, discontinue this appendix but continue to monitor the thermocouple readings.	
3. Monitor the thermocouple readout on PAMS 3 and 4. If 5 or more thermocouple readings exceed 1200°F notify the Shift Foreman that inadequate core cooling exists and go to Step 5. If there are not 5 or more readings that exceed 1200°F, discontinue this appendix but continue to monitor the thermocouple readings.	
4. The Shift Foreman will verify if inadequate core cooling exists using the appropriate steps above. If inadequate core cooling exists the Shift Foreman will direct operations as follows:	

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

TITLE EMERGENCY PROCEDURE
ESTABLISHMENT OF THE ON-SITE EMERGENCY ORGANIZATION

NUMBER EP G-2
REVISION 4
DATE 3/15/84
PAGE 1 OF 20

IMPORTANT TO SAFETY

APPROVED _____ PLANT MANAGER 4-30-84 DATE

SCOPE

This procedure describes the responsibilities of the positions in the On-site Emergency Organization and the actions required by plant personnel for establishing the On-site Emergency Organization.

This procedure and changes thereto require PSRC review.

GENERAL

1. The transition from a normal operating organization to an On-site Emergency Organization involves the following three basic steps:

   a. Filling appropriate On-site Emergency Organization positions on an interim basis with personnel who are immediately available on-site at the time of the emergency. See Figure 1 for the description of the "Suggested Interim Emergency Organization."

   b. Notifying plant personnel off-site and on-site that their assistance is required (refer to EP G-2 Supplement 1 for instructions on this).

   c. Filling positions in the long-term emergency organization, as described in Figure 2, "Long-Term Emergency Organization," with appropriate plant personnel as they arrive at the Control Room, Operations Support Center, Technical Support Center, or the Emergency Operations Facility.

2. Plant personnel shall be assigned to emergency organization positions on an interim or long-term basis and are ranked in order of preference according to Supplement 1, "Emergency Organization Call List." Interim position-holders shall be responsible for performing the duties of the position as described in Table 1, "On-site Emergency Organizations' Responsibilities," until relieved by the long-term

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been implemented, and upon direction from the Shift Foreman, proceed as follows:

   a. Designate this event a Nofification of Unusual Event if ECCS flow is indicated. Notify plant staff and response organizations required for this classification by implementing Emergency Procedure G-2 "Establishment of the On-Site Emergency Organization" and G-3 "Notification of Off-Site Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation".

   b. Reclassify this event according to the Appendix Z instructions in OP-3A "Steam Generator Tube Rupture" or OP-1 "Loss of Coolant Accident", if the accident diagnostics require implementation of either these procedures.

   c. In the event inadequate core cooling is verified per Appendix B reclassify this event as a General Emergency. Notify plant staff and response organizations required by EP G-2 and G-3 in accordance with EP G-1.

INITIATING CONDITIONS

Notification and establishment of the On-site Emergency Organization shall be initiated by the Shift Foreman when he declares an Unusual Event, Alert, Site Area or General Emergency in accordance with Emergency Procedure G-1, "Accident Classification and Emergency Plan Activation."

IMMEDIATE ACTIONS

1. The Shift Foreman shall assume the position of the interim Site Emergency Coordinator, assess the situation, and appoint members of the on-site operating staff to assume the positions shown in Figure 1, "Interim Site Emergency Organization," as he deems necessary to terminate or mitigate the emergency.

NOTIFICATION OF AN UNUSUAL EVENT

1. The interim Site Emergency Coordinator shall contact, as a minimum, position holders for the long-term emergency organization positions indicated by the Unusual Event Stop Callout Point on the "Emergency Organization Call List" in Supplement 1. Personnel contacted will inform the caller as to whether they will proceed to their emergency response location or remain on standby status.

2. Additional plant personnel may be called out as deemed necessary by any of the above personnel.

NOTIFICATION OF AN ALERT, SITE AREA EMERGENCY, OR GENERAL EMERGENCY

1. The interim Site Emergency Coordinator shall contact position-holders to fill positions in the long-term emergency organization per Form 69-10297, "Emergency Organization Call List." During normal working hours, sounding of the Site Emergency Signal may be used as a means of establishing the emergency organization.

position-holder. Long Term position holders are responsible for performing the duties of the position, as described in Table 1, until duly relieved, and permission for relief is received from the Site Emergency Coordinator, or the Site Emergency Coordinator determines that the emergency organization position is no longer required. Form 69-9370, "Site Emergency Organization Assignments" may be used to record emergency assignments and shift rotations.

3. The Shift Foreman shall remain in the Control room, where he is responsible for overall command and control of the emergency. He shall assume the position of the interim Site Emergency Coordinator. He shall not become totally involved in any single operation but shall maintain a broad perspective of operational conditions affecting the safety of the plant, in compliance with Nuclear Plant Administrative Procedure, NPAP A-102.

4. When an emergency is declared and notification of plant staff and offsite response organizations is in process, incoming phone calls on the plant emergency number shall be answered and the plant emergency number shall be provided to offsite personnel needing to contact the plant. Calls on the normal plant number will be answered to the extent possible without interfering with the emergency response.

5. All notifications shall be recorded,Form 69-10297 "Emergency Organization Call List," should be used for initial callout. Form 69-9221, "Emergency Notification Record" or a log should be used to record incoming calls or calls to persons not on Form 69-10297.

6. All records generated by the utilization of this procedure for an exercise or emergency shall be forwarded the next working day to the Assistant Plant Manager, Support Services, for review and retention.

   a. Records generated from exercises will be categorized as non permanent and retained for a minimum of five years.

   b. Records generated from actual emergency events will be categorized as lifetime and placed into lifetime storage in accordance with procedure "Requirements for Retention and Extended Storage of Operation Phase Activity Records (AP E-1S1)."

EP G-3, "Notification of Off-site Organizations"

EP G-4, "Personnel Assembly and Accountability"

AP E-1S1, "Requirements for Retention And Extended Storage Of Operation Phase Activity Records"

AP A3, Supplement 1, "On Call System and Personnel Availability"

NPAP A-102, "General Authorities And Responsibilities Of The Shift Foreman"

TABLES

1. On-site Emergency Operating Organization - Responsibilities

FIGURES

1. Typical On-Shift Emergency Organization And Assignments
2. Long-term Emergency Organization
3. Interim EOF Organization

ATTACHMENTS

1. Form 69-9370, "Site Emergency Organization Assignments."
2. Form 69-9221, "Emergency Notification Record."

2. During off-normal hours or if sounding the Site Emergency Signal is not desirable, the interim Site Emergency Coordinator shall appoint a Liaison Assistant who shall notify necessary plant personnel per Supplement 1 to this procedure. The Liaison Assistant may perform the callout from the control room area or may be dispatched to the Technical Support Center (TSC) to activate the TSC telephone switchboard to receive incoming emergency calls and complete plant staff notification.

3. If long-term emergency position holders and support staff are already on station, notify them of the escalation or reduction of the emergency classification. Particular care should be given to notifying personnel at the following locations:

   a. TSC or Control Room (depending on location of the Site Emergency Coordinator)

   b. EOF, and monitoring teams under the control of EOF.

   c. OSC and Security Shift Supervisor

   d. Personnel who may be performing emergency actions in various areas of the plant site (other than at emergency facilities).

4. Additional Liaison Assistants may be assigned to assist in notifications or coordinate message dissemination between the Site Emergency Coordinator and the Emergency Liaison Coordinator.

5. Support staff called on-site (who are not given a predesignated response location) should be directed to report to the Security Building lunchroom. Upon arrival, they will call the TSC or Control Room to receive further direction.

SUPPORTING PROCEDURES

EP G-1, "Accident Classification and Emergency Plant Activation"

EP G-2, Supplement 1

*j. Authorized any extraordinary emergency measures, such as the use of company emergency personnel exposure limits.

2. The Site Emergency Coordinator will establish the emergency response organization in the TSC and then relieve the individual who initially assumed the interim Site Emergency Coordinator duties (normally the Shift Foreman) and assume the following duties.

a. Prior to the time that the corporate Recovery Manager assumes his position at the Emergency Operation Facility, the Site Emergency Coordinator is responsible to:

*1) Provide direction for all emergency response operations performed by Company personnel in the San Luis Obispo County Area.

*2) Authorize any recommendations of the Company regarding evacuation, confiscation of food, or other emergency measures, to noncompany emergency support groups.

*3) Authorize changes in the Emergency Action Level classification to off-site authorities.

*4) Authorize any extraordinary emergency measures, such as the use of company emergency personnel exposure limits.

5) Request assistance as necessary for on-site or off-site radiation monitoring from federal agencies, either through the county/state emergency response organization once established, or directly.

b. Coordinate and direct all on-site activities.

c. Maintain liaison with off-site emergency support groups providing on-site assistance and support the corporate Recovery Manager in the development of a coordinated recovery action plan for on-site.

d. Recommend changes in Emergency Action Level Classification to the Recovery Manager.

*Responsibility that may not be delegated.

TABLE 1
ON-SITE EMERGENCY ORGANIZATION RESPONSIBILITIES

A. Site Emergency Coordinator

1. Prior to being relieved by the Site Emergency Coordinator, the Interim Site Emergency Coordinator is responsible for the following in addition to the duties and responsibilities of the Shift Foreman:

*a. Make the initial evaluation and classification of the situation.

*b. Assign plant staff personnel to positions in the Site Emergency Organization.

c. Notify, or direct the notification of:

1) Plant staff personnel
2) Company off-site emergency organizations
3) Local noncompany emergency support groups
4) San Luis Obispo County, California Office of Emergency Services and the Nuclear Regulatory Commission

*d. Authorize the sounding of the site emergency signal.

*e. Authorize the evacuation of the plant site and specify the appropriate evacuation route.

*f. Authorize overtime and other expenses associated with establishing and maintaining an appropriate site emergency organization.

*g. Provide direction for all emergency response operations performed by Company personnel in the San Luis Obispo County Area.

*h. Maintain liaison with off-site emergency support groups.

*i. Make protective action recommendations regarding evacuation, sheltering, confiscation of food, or other emergency measures to local government agencies.

*Responsibility that may not be delegated.

3. Maintain contact with on-site and off-site emergency support groups, regulatory agencies, and monitoring teams and transmit instructions and information to and from the Site Emergency Coordinator.

4. Maintain records of incoming and outgoing messages. Operate communications equipment and develop message content as required to support the above.

5. Provide general assistance to the Site Emergency Coordinator.

C. Liaison Assistant

1. Assist the Emergency Liaison Coordinator in communications and recording messages and carrying out his assigned duties.

D. Emergency Maintenance Coordinator

This position provides coordination of maintenance, repair and material deployment in response to the emergency situation with the following duties and responsibilities:

1. At the direction of the Site Emergency Coordinator fabricate and set up any special equipment necessary for recovery operations.

2. Provide management direction to the Operational Support Center Supervisor and maintenance organizations.

3. Coordinate the movement and accountability of support personnel brought to the site.

4. Provide general advice and assistance in these matters to the Site Emergency Coordinator and other evaluations personnel.

E. Maintenance Organizations

Electrical, mechanical and instrument coordinators are assigned to provide technical advice in these areas and supervise maintenance, repair or installation of special equipment required to respond or recover from the emergency at the direction of the Emergency Maintenance Coordinator.

e. Manager TSC Operations through the three TSC Emergency Coordinators. This includes collecting and analyzing the technical information necessary for assessment of plant operational aspects, providing technical counsel in support of the Control Room (CR), assessment of radiological release potential, and determination of actual or potential release rates,on-site exposure monitoring and contamination control, repair of plant components or systems as required by the emergency and/or consequences, and on-site personnel accountability.

f. Provide management direction to the Control Room (CR) through the Emergency Operations Coordinator.

g. Provide management direction to the Operational Support Center (OSC) through the Emergency Maintenance Coordinator.

h. Assign plant staff personnel to positions in the On-site Emergency Organization as appropriate.

*i. Authorize overtime and other expenses associated with maintaining an appropriate On-site Emergency Organization throughout the recovery period.

j. Establish and maintain on-site personnel accountability.

*k. Authorize the evacuation of the plant site and specify the appropriate evacuation route.

*l. Obtain the Recovery Managers approval prior to authorizing any extraordinary emergency measures such as the use of Company emergency personnel exposure limits.

B. Emergency Liaison Coordinator

This position provides control of verbal and written communications to and from the site with the following duties and responsibilities:

1. Handle communications to and from the site and between site emergency response groups.

2. As directed by the Site Emergency Coordinator, notify plant staff and other affected individuals and organizations of the emergency and their assignments.

*Responsibility that may not be delegated.

7. Provide operation and control of emergency data transmission systems, and review and evaluate plant data.

H. Emergency Radiological Advisor

This position provides overall coordination of radiological aspects of the emergency with the following duties and responsibilities:

1. Advise the Site Emergency Coordinator and/or Emergency Evaluations and Recovery Coordinator on matters relating to radiological safety.
2. He shall be responsible for coordinating and supervising radiological surveys and investigations, both in plant and near site. He will work with the Radiological Emergency Recovery Manager in making an overall assessment of radiological conditions.
3. Coordinate and supervise all on-site radiological surveys and investigations, and provide management of the on-site radiation protection program.
4. Assist the Emergency Evaluation and Recovery Coordinator in operation and control of radiological emergency data transmission systems, review and evaluation of data from these systems, and development of data and status updates for transmission off-site

I. Site Chemistry and Radiation Protection Coordinator

This position assists the Emergency Radiological Advisor in coordinating on-site radiological protection and chemical and radiological surveys and investigations. These duties include the following:

1. Personnel exposure monitoring and record keeping.
2. Radiological and chemical analysis of in-plant samples.
3. In-plant surveys and establishment of radiation and/or contamination control area boundaries.
4. Determine radiation protection access requirements for entry to controlled areas.

F. Operations Support Center Supervisors

These positions are initially filled by the designated assembly area supervisors assigned to the access control and adjacent cold machine shop in-plant assembly areas. (See EP G-4 "Personnel Assembly and Accountability.") These persons are responsible for personnel accountability in these areas and immediate dispatch of fire fighting, maintenance, search and rescue and/or radiological monitoring personnel to assist the shift staff in response to the emergency.

Following the initial response, personnel called from off-site or out of plant assembly areas will initially assemble at the plant security building lunchroom where a maintenance foreman will be designated Operational Support Center (OSC) supervisor to coordinate assignment of personnel to tasks designated by the control room or technical support center and maintain accountability of personnel dispatched from the OSC.

G. Emergency Evaluations and Recovery Coordinator

This position provides overall technical coordination of the plant response activities with the following duties and responsibilities:

1. Evaluate the safety consequences of the occurrence and advise the Site Emergency Coordinator accordingly of appropriate response actions and on-site and off-site recommended protective measures.

2. Advise the Site Emergency Coordinator on technical matters relating to nuclear and radiological safety.

3. Provide coordination and supervision of all company support teams operating at or in the vicinity of the site.

4. Provide coordination and supervision of all company technical support work as part of the overall recovery program developed by the Site Emergency Coordinator and Recovery Manager.

5. Advise the Site Emergency Coordinator of actions and findings of company support groups.

6. Assist the Site Emergency Coordinator in determining personnel deployment to emergency support assignments.

2. Maintain communications with the Emergency Operations Facility and Mobile Environmental Monitoring Laboratory for reporting results and maintaining cognizance of the emergency situation.

3. Coordinate monitoring activities and reporting of results with the county personnel assigned to the monitoring team.

4. Provide recommendations regarding establishing controlled access areas and determining the boundaries of such areas in cooperation with county personnel assigned to the monitoring team.

5. Assist in monitoring personnel and evaluating their exposure as required.

6. Maintain proper logs and records.

7. Keep the Radiological Emergency Recovery Manager informed of their actions and findings.

L. Emergency Operations Coordinator

This position provides senior plant management representation in the control room.

1. Manage Operational Activities.

2. Supervise the Shift Foreman in the operational control of the plant.

3. Advise the Site Emergency Coordinator on operational matters.

M. Emergency Operations Advisor

This is a position filled by an individual knowledgeable in operational matters to provide general operational advice and assistance to the Site Emergency Coordinator and other evaluations personnel in the TSC. This position may be assigned other operational duties such as radwaste management as required by the situation.

5. Maintain proper records and logs.

6. Keep the Emergency Radiological Advisor and/or the Emergency Evaluation and Recovery Coordinator informed of actions and findings.

J. EARS Operator - TSC

This position assists the Emergency Radiological Advisor in radiological data processing.

K. Emergency Radiological Monitoring Teams

Emergency radiological teams will be 2-man teams established for near site and off-site monitoring in the event of a radiological release emergency. They have the following duties and responsibilities:

Near Site Team(s):

1. Perform radiation surveys in and around the plant site and obtain appropriate samples for analysis.

2. Maintain communications with the Control Room or Technical Support Center for reporting monitoring results and maintaining cognizance of the emergency situation.

3. Establish controlled access areas to contain or limit the spread of radioactive contamination, as appropriate.

4. Issue personnel protective equipment and clothing.

5. Establish and post radiation and/or contamination area boundaries.

6. Monitor personnel and evaluate their exposure, if required.

7. Maintain proper records and logs.

8. Keep the Emergency Radiological Advisor and/or the Emergency Evaluation and Recovery Coordinator informed of their actions and findings.

Off-Site Team(s):

1. Perform radiation surveys at off-site locations as designated by the Radiological Emergency Recovery Manager and obtain appropriate samples for analysis.

and are authorized to take action to the extent justified. Personnel in the immediate area of the injured personnel, or as dispatched by the Site Emergency Coordinator, will provide care until off-site assistance arrives.

R. Data Processing

These positions provide engineering assistance to the Emergency Evaluation and Recovery Coordinator in performing those duties relating to evaluation of plant core/thermal hydraulics, electrical and mechanical data, coordination of technical support work, operation of computer systems and other on-site emergency response activities.

S. Advisor to the County Emergency Organization

The function of this position is to activate and provide interim management of the Emergency Operations Facility and be available to advise the County Emergency Organization on the meaning and significance of information being transmitted from the site. Basic duties and responsibilities include:

1. Prior to the arrival of the Recovery Manager and until relieved, act as the EOF Director to activate the utility portion of the Emergency Operation Facility (EOF and UDAC trailers). In this capacity, specific functions include:

   a) Direct the activation of the utility portion of the Emergency Operation Facility (trailer) by appropriately energizing equipment and activating communications.

   b) Provide administrative and management direction of the EOF interim staff in carrying out the duties of the Radiological Emergency Recovery Manager, the Public Information Recovery Manager, the Operations and Analytical Recovery Manager, and the EOF-EARS operator.

   c) Keep the Site Emergency Coordinator informed and serve as his single point contact at the EOF.

2. Keep the senior county response staff member advised of plant conditions and recommended protective actions.

3. Coordinate security of the EOF, UDAC and EOC with the Sheriff's office.

N. Shift Engineer

This is a position in the normal operating organization which shall remain filled throughout the emergency recovery period. The initial function of this individual is to assist the Shift Foreman in the evaluation of the occurrence, possible consequences, and possible courses of action. In the long term, this position may assist in the Control Room or TSC on plant evaluation or radiological evaluation, as required by the occurrence.

N. Fire Brigades

These teams are responsible for on-site fire suppression activities.

O. Evacuation Coordinator

This is a temporary position to coordinate evacuation of non-essential personnel from the site if warranted by the situation. It would normally be assigned to the security force staff but may be assigned to a member of the emergency planning staff.

P. Evacuation Team

These are temporary positions consisting of a group leader and a monitor who will accompany the evacuees in the event a site evacuation is necessary. The basic functions of this team are to:

1. Assure that the evacuees stay together and take the correct route.

2. Assist in personnel accountability at the evacuation off-site assembly area.

3. Secure radiation survey equipment and survey personnel and vehicles at the collection area and arrange for decontamination as required.

Q. First-Aid and Medical

Although the importance of providing prompt first-aid is well recognized, no provisions are include for establishing a first-aid team. All plant staff shall receive first-aid training

3. Coordination and direction of off-site response activities involving local support, including activation and operation of radio and telephone systems and maintaining proper records of communications.

W. Interim Public Information Recovery Manager

This position assists the Advisor to the County Emergency Organization in formulating news releases concerning the emergency condition, obtaining approval of the release, and coordinating the news release with county and corporate public information personnel. It is staffed by a local public information representative until relieved by the Corporate Public Information Recovery Manager.

X. Technical Advisor to the Public Information Recovery Manager

This position assists the Public Information Recovery Manager by providing technical assistance in the preparation of news releases and participation in news media briefings.

Y. Monitoring Team Liaison Coordinator

This position assists the Radiological Emergency Recovery Manager in communications with monitoring teams, the mobile van, UDAC and other emergency response locations until relieved by the Corporate Monitoring Director.

Z. County Liaison

This position assists the Advisor to the County Emergency Organization by facilitating the flow of information between the EOF and EOC.

T. Interim Radiological Emergency Recovery Manager

This position assists the Advisor to the County Emergency Organization in coordination and direction of all off-site radiological assessment activities and development of radiological status information, until relieved by the corporate Radiological Emergency Recovery Manager. Basic duties and responsibilities include:

1. Develop radiological data and status information for approval and distribution to EOF, UDAC and EOC personnel.

2. Direct the activities of off-site monitoring teams and the mobile environmental monitoring laboratory, maintain records, and provide findings in status reports.

3. Perform dose projections and provide radiological assessment information for the determination of protective action recommendations.

U. EARS Operator--EOF

This position assists the Radiological Emergency Recovery Manager in the performance of his duties, including activation and operation of the EARS computer system, activation and operation of the health physics radio system and communication with off-site monitoring teams and maintenance of logs and record and preparation of status reports as directed, until relieved by the corporate EOF EARS operator.

V. Interim Operations and Analytical Recovery Manager

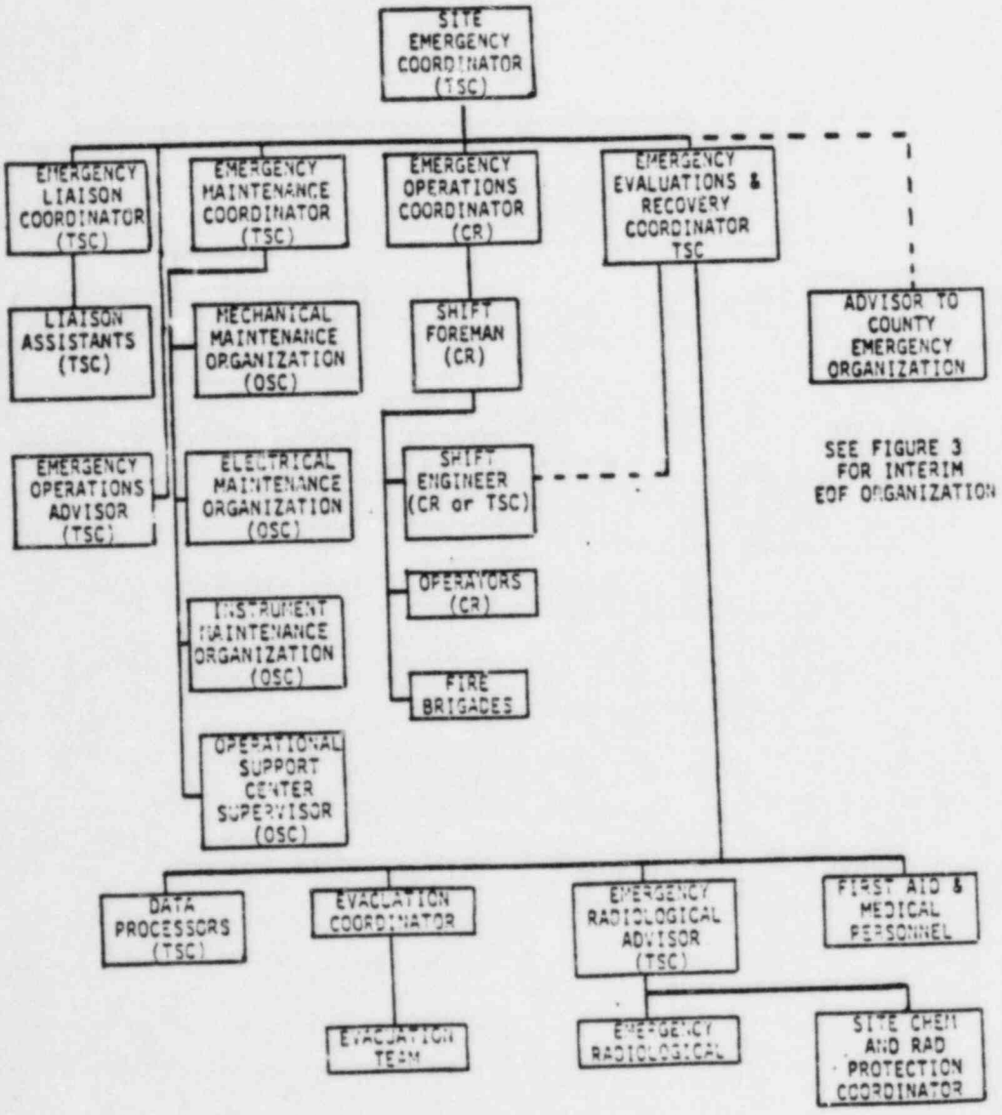
This position assists the Advisor to the County Emergency Organization in providing plant status information and coordination of local off-site emergency response activities, as directed, until relieved by the Corporate Operations and Analytical Recovery Manager. Basic duties and responsibilities include:

1. Activation and operation of plant data computer systems for obtaining plant data.

2. Preparation of plant status updates for approval and distribution to EOF, UDAC and EOC personnel.

FIGURE 2

LONG-TERM EMERGENCY ORGANIZATION

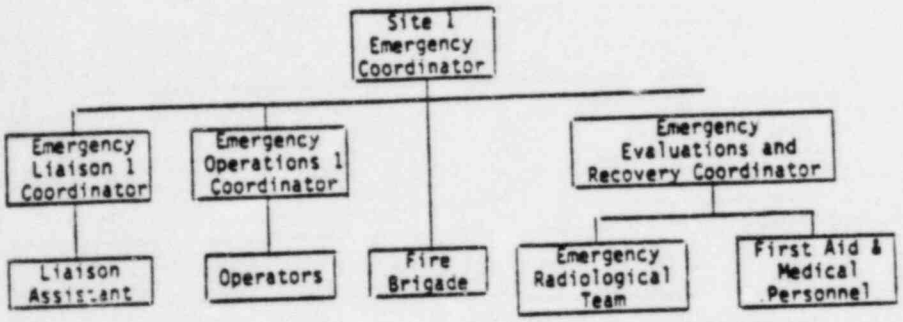


LEGEND:

_____ Line Authority
- - - - - Line Authority until Recovery Manager Assumes EOF Management
EOF - Emergency Operations Facility
TSC - Technical Support Center
OSC - Operational Support Center

FIGURE 1

TYPICAL ON-SHIFT EMERGENCY ORGANIZATION AND ASSIGNMENTS



Position	Typical Assignment
Interim Site Emergency Coordinator[1] (See Table 1 for responsibilities)	Shift Foreman (Shift Engineer if not available)
Interim Emergency Liaison Coordinator[1] (Develops notification messages and performs off-site notification)	Auxiliary Operator, or Shift Control Technician
Interim Emergency Operations Coordinator[1] (Provides operational control of the plant)	Sr. Control Operator or Control Operator
Interim Emergency Evaluations & Recovery Coordinator (Plant and Radiological Assessment)	Shift Engineer (STA) (Assisted by Shift C&RP Technician and/or Control Operators if necessary)
Liaison Assistants (Notifies plant staff, coordinates message dissemination among liaison personnel)	Shift Clerk, Auxuliary Operator or Shift Control Technician
Operators	Assignments per the Interim Site Emergency Coordinator
Fire Brigade	See Emergency Procedure M-6 or R-6
Emergency Radiological Team	Shift C&RP Technician and Auxiliary Operator (if required)
First Aid and Medical	Employees at the scene

[1]Required Assignments

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER EP G-2S1
REVISION 0
DATE 3/22/84
PAGE 1 OF 1

TITLE EMERGENCY PROCEDURE
EMERGENCY ORGANIZATION CALL LIST FORM 69-10297

IMPORTANT TO SAFETY

APPROVED R. C. Thornberry PLANT MANAGER 4-30-84 DATE

SCOPE

This procedure supplement provides the call sequence and listed numbers for the notification of the on-site emergency organization, and indicates the preferred candidates to fill each position as required by Administrative Procedure NPAP A-5.

This procedure and changes thereto requires PSRC review.

PROCEDURE

Notification of required personnel in an emergency is made using the listed numbers and call sequence of this supplement, Form 69-10297, "Emergency Organzation Call List."

The preferred position holders should be contacted when possible. An "On-Call" rotation for essential positions in the emergency organization is maintained in accordance with NPAP A-3, Supplement 1. The on-call person may be called if the preferred position holder is not immediately available or whenever judged necessary by the Shift Foreman. The primary means of notification during "off hours" or when the site emergency signal is not sounded during normal working hours is the telephone. The secondary means of notification is the pager for those individuals designated "ON CALL". Key plant managers have UHF radio equipped cars which can be used for initial contact and two way communcations while enroute to the plant. Because these persons are essentially on-call at all times, use of these vehicles is warranted in off hours to ensure rapid communication and response.

SUPPORTING PROCEDURES

NPAP A-5, "Ogranizational Control Of Emergencies"

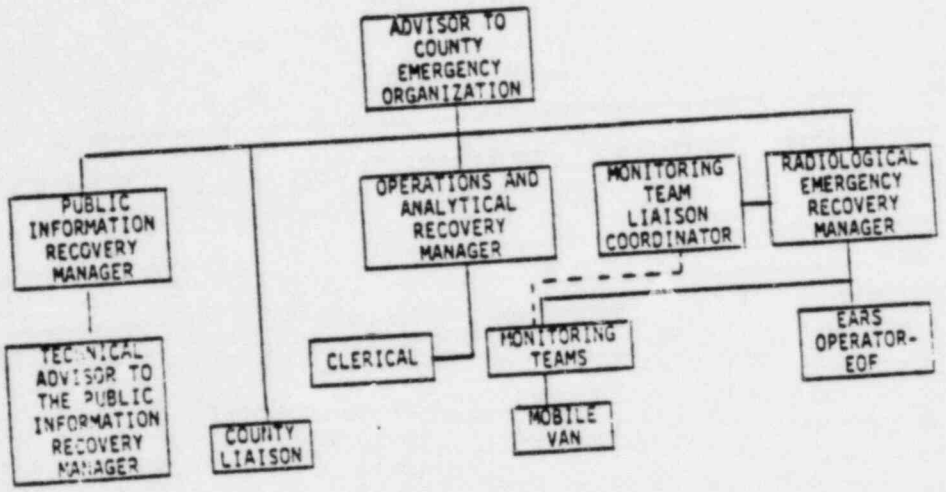
NPAP A-3, Supplement 1, "On Call System & Personnel Availability"

ATTACHMENTS

Form 69-10297, "Emergency Organization Call List"

FIGURE 3

INTERIM EOF ORGANIZATION



----------Indicates Communication Channel

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER EP G-2S1
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PAGE 1 OF 1

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APPROVED R. C. Thornberry PLANT MANAGER DATE 4-30-84

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NPAP A-3, Supplement 1, "On Call System & Personnel Availability"

ATTACHMENTS

Form 69-10297, "Emergency Organization Call List"

. Describe emergency classification and

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

MERG. ORGANIZ. POSITION	NOT AVAIL ABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES	NO	TIME	WILL BE IN YES	NO
			alled for. Describe eve							
mergency adiological dvisor (Assigned to TSC)	____	____	*1. J. V. Boots Chem & Rad Prot. Mgr.			____	____	____	____	____
			sification or higher; opt							
	____	____	*2. W. A. O'Hara Sr. Chem & Rad Prot. Eng.	ng.		____	____	____	____	____
	____	____	*3. H. W. C. Fong Chem & Rad Prot. Eng.	ng.		____	____	____	____	____

HOME PHONE/ PLANT PHONE	H/P FRE PAGER CA GROUP CA

DC0234 211

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the page or this position)

Event Description: _____

DC0234 211

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

EMERGENCY ORGANIZATION CALL LIST

all Out Instructions:

. Contact one person for each position.
. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
. Persons with a * are designated for on-call rotation.
. Describe emergency classification and position person is called for. Describe event if requested.

OTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

MERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
mergency iaison ordinator Assigned , TSC)	____	____	*1. T. J. Martin Training Manager			____ ____	____	____ ____
	____	____	*2. J. E. Molden Trng. Coordinator			____ ____	____	____ ____
	____	____	*3. W. F. Steinke Trng. Coordinator			____ ____	____	____ ____
	____	____	*4. J. R. Tinlin Training Coordinator			____ ____	____	____ ____

DC0234
611

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

EMERGENCY ORGANIZATION CALL LIST

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Advisor to the County Emerg. Organization (Assigned to EOF)	____	____	*1. W. B. Kaefer Support Services Mgr.			____ ____	____	____ ____
	____	____	*2. W. J. Keyworth Emergency Planning Supervisor			____ ____	____	____ ____
	____	____	*3. T. E. Brake Pow. Prod. Eng. (PIMS)			____ ____	____	____ ____
	____	____	*4. W. J. Kelly Regulatory Compliance Engineer			____ ____	____	____ ____

DC0234
'11

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pag 'or this position)

EMERGENCY ORGANIZATION CALL LIST

all Out Instructions:

. Contact one person for each position.
. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
. Persons with a * are designated for on-call rotation.
. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
mergency perations dvisor Assigned TSC)	____	(No On-Call Person for this position)	1. J. A. Sexton Operations Manager			___ ___	___	___ ___
	____		2. S. R. Fridley General Operating Foreman			___ ___	___	___ ___
	____		3. T. J. Martin Training Manager			___ ___	___	___ ___
	____		4. W. G. Crockett Sr. Power Prod. Eng. (Operations)			___ ___	___	___ ___

DC0234
811

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

EMERGENCY ORGANIZATION CALL LIST

all Out Instructions:

. Contact one person for each position.
. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
. Persons with a * are designated for on-call rotation.
. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES	CONTACTED NO	TIME	WILL BE IN YES	WILL BE IN NO
mergency perations dvisor Assigned TSC)	____	(No On-Call Person for this position)	1. J. A. Sexton Operations Manager			____	____	____	____	____
	____		2. S. R. Fridley General Operating Foreman			____	____	____	____	____
	____		3. T. J. Martin Training Manager			____	____	____	____	____
	____		4. W. G. Crockett Sr. Power Prod. Eng. (Operations)			____	____	____	____	____

DC0234
811

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

EMERGENCY ORGANIZATION CALL LIST

NOT FOR PUBLIC DISCLOSURE

ll Out Instructions:

Contact one person for each position.
Contact first listed available person (preferred position holder); if unavailable, contact the next available person
Persons with a * are designated for on-call rotation.
Describe emergency classification and position person is called for. Describe event if requested.

E: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

RG. ANIZ. SITION	NOT AVAIL ABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
ergency Main-nance Coor-nator ssigned TSC)	____	____	*1. D. B. Miklush Maintenance Manager			____ ____	____	____ ____
	____	____	*2. R. Nanninga Sr Pow Prod Eng (Maint)			____ ____	____	____ ____
	____	____	*3. D. L. Bauer Sr. Pow. Prod. Eng.			____ ____	____	____ ____
	____	____	*4. W. R. Ryan Gen. Maint. Foreman			____ ____	____	____ ____
	____	____	*5. G. M. Zocher Gen. Elec. Foreman			____ ____	____	____ ____

)TE: 1) Stop call out at this point for the Unusual Event Classification, continue for high classification. Determine if the Site Emergency Coordinator requires additional personnel.

)erations upport Center upervisor	Request the Emergency Maintenance Coordinator to assign a maintenance foreman as OSC support center supervisor.

DC0234
91

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the page this position)

EMERGENCY ORGANIZATION CALL LIST

9-10297 4/84 (100)

all Out Instructions:

. Contact one person for each position.
. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
. Persons with a * are designated for on-call rotation.
. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher.

MERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Site Chemistry & Radiation Protection Coordinator (Assigned to Access Control)	____	____	*1. H. A. Ferguson Rad. Prot. Mon. Foreman			____ ____	____	____ ____
	____	____	*2. L. T. Moretti Chem & Rad Prot. Forema			____ ____	____	____ ____
	____	____	*3. R. S. Snyder Chem & Rad Prot. Forem			____ ____	____	____ ____
	____	____	*4. P. W. Baxter Rad. Prot. Mon. Foreman			____ ____	____	____ ____
	____	____	*5. L. Vulchev Chem & Rad Prot. Foreman					

DC0234
1011

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

EMERGENCY ORGANIZATION CALL LIST

all Out Instructions:

(Contact one person for each position.
. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
. Persons with a * are designated for on-call rotation.
: Describe emergency classification and position person is called for. Describe event if requested.

OTE: Personnel to report to assigned location for Alert Classification or higher.

MERG. RGANIZ. OSITION	NOT AVAIL ABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	M/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES	CONTACTED NO	TIME	WILL BE IN YES	WILL BE IN NO
ut-of-Plant onitoring & n-Plant hemistry & adiation rotection ersonnel Six assigned o mobil van arage; six ssigned to lant)	___	(No on-call person for this position)	1. H. A. Ferguson Rad. Prot. Mon. Foreman			___	___	___	___	___
	___		2. L. T. Moretti Chem & Rad. Prot. Forema			___	___	___	___	___
	___		3. R. S. Snyder Rad. Prot. Mon. Foreman			___	___	___	___	___
	___		4. P. W. Baxter Chem & Rad Prot. Eng.			___	___	___	___	___
	___		5. W. A. O'Hara Chem & Rad. Prot. Eng.			___	___	___	___	___
	___					___	___	___	___	___

NOTE: A. Request a minimum of six personnel for initial Off-Site Monitoring Teams.
B. Request a minimum of six C&RP Personnel for in-plant monitoring and chemistry.
D. A minimum of two of the above personnel are "on-call" as Emergency Radiological Advisor or site Chemistry and Radiation Protection Coordinator.

DC0234
'''1

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pag · this position)

EMERGENCY ORGANIZATION CALL LIST

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MERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
TSC/EOF Clerical Assistance	___	(No on-call person for this position)	1. C. D. Lampert Office Supervisor			___ ___	___	___ ___
	___		2. K. C. Long Asst. Office Supervisor			___ ___	___	___ ___
	___		3. M. A. Huff Senior Plant Clerk			___ ___	___	___ ___

NOTE: Request supervisor to dispatch three (3) clerks to the TSC and two (2) clerks to the EOF.

DC0234
1211

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

EMERGENCY ORGANIZATION CALL LIST

Call Out Instructions:

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3. Persons with a * are designated for on-call rotation.
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NOTE: Personnel to report to assigned location for Alert Classification or higher.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES	CONTACTED NO	TIME	WILL BE IN YES	WILL BE IN NO
Interim Radiological Emergency Recovery Manager (Assigned to EOF)	___	(No on-call person for this position)	1. W. A. O'Hara Sr. Chem & Rad Prot. Eng.			___	___	___	___	___
	___		2. S. J. Fahey-Benson Chem & Rad Prot. Eng.			___	___	___	___	___
			3. B. D. Guilbeault Chem. & Rad. Engineer							

DC0234
111

1. Insert date person is not available.
2. Insert date person assumes "on-call" ponsibility.
(Person on call will possess the pa or this position)

ill Out Instructions:

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. Persons with a * are designated for on-call rotation.
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OTE: Personnel to report to assigned location for Alert Classification or higher.

MERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
nterim OF-EARS perator (Assigned to OF)	____	(No on-call person for this position)	1. W. B. Scott Pwr. Prod. Eng. (Staff)			____ ____	____	____ ____
	____		2. D. R. Unger Chem and Rad Prot. Engr.			____ ____	____	____ ____
			3. E. R. Psoter Chem and Rad Protection Analyst					

DC0234 1411

1. Insert date person is not available.
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Interim Operations and Analytical Recovery Manager (Assigned to OF)	____	(No On-call person for this position)	1. W. T. Rapp Sr. Nuclear Gen. Engr.			____	____	____	____	____
	____		2. K. C. Doss Sr. Nuclear Gen. Engr.			____	____	____	____	____

DC0234 1. Insert date person is not available.
"11 2. Insert date person assumes "on-call" r ponsibility.
(Person on call will possess the pag r this position)

EMERGENCY ORGANIZATION CALL LIST

59-10297 4/84 (100)

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	PAGER CALL # GROUP CALL #	CONTACTED YES	CONTACTED NO	TIME	WILL BE IN YES	WILL BE IN NO
Interim Public Information	___	(Both personel carry pagers)	1. Sue Brown Public Information			___	___	___	___	___
Recovery Manager (Assigned to EOF)	___		2. Missie P. Hobsom Public Information			___	___	___	___	___
	___		3. Pam Zweifel Manager, Information Center			___	___	___	___	___

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

EMERGENCY ORGANIZATION CALL LIST

)-10297 4/84 (100)

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NOTE: Personnel to report to assigned location for Alert Classification or higher.

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						___ ___	___	___ ___
Technical Advisor to the Public Information	___	(No On-Call Person for this position)	1. W. J. Keyworth Emergency Planning Supervisor					
Recovery Manager (Assigned to EOF)	___		2. W. J. Kelly Pow. Prod. Eng. (Staff)			___ ___	___	___ ___

DC0234
711

1. Insert date person is not available.
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(Person on call will possess the pag 'or this position)

)-10297 4/84 (100)

EMERGENCY ORGANIZATION CALL LIST

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						___	___	___	___	___
Mobil Environmental Monitoring Laboratory Operator	___	(Personnel rotate pager as required)	1. Roland Richardson Dept. of Engr. Research							
	___		2. Mike Kunde Dept. of Engr. Research			___	___	___	___	___

DC0234
1811

1. Insert date person is not available.
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EMERGENCY ORGANIZATION CALL LIST

39-10297 4/84 (100)

Call Out Instructions:

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NOTE: Personnel to report to assigned location for Alert Classification or higher.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
						__ __	____	__ __
EARS Operator TSC (Assigned to TSC)	____	____	*1. R. H. Garacci Sr. Chem & Rad Prot. Analyst			__ __	____	__ __
	____	____	*2. J. N. Johnson Chem & Rad Prot. Analyst			__ __	____	__ __
	____	____	*3. E. R. Psoter Chem & Rad Prot. Analyst					

DC0234 -1

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the page for this position)

EMERGENCY ORGANIZATION CALL LIST

)-10297 4/84 (100)

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NOTE: Personnel to report to assigned location for Alert Classification or higher.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
						___ ___	___	___ ___
Emergency Liaison Assistant #1 (Assigned to TSC)	___	___	1. J. E. Molden Trng. Coord.			___ ___	___	___ ___
	___	___	*2. L. R. Sawyer Asst. Trng. Coord.			___ ___	___	___ ___
	___	___	*3. R. F. Sargent Asst. Trng. Coord.			___ ___	___	___ ___
	___	___	*4. R. L. Graham Asst. Trng. Coord.			___ ___	___	___ ___
	___	___	*5. J. P. Northness Asst. Trng. Coord.					

DC0234
2011

1. Insert date person is not available.
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EMERGENCY ORGANIZATION CALL LIST

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. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
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. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Emergency Liaison Assistant #2 (Assigned			1. J. R. Tinlin Trng. Coordinator					
			*2. W. E. Weems Asst. Trng Coordinator					
			*3. B. A. Terrell Asst. Trng. Coordinator					
			*4. B. A. Lewis Asst. Trng. Coordinator					

DC0234
?111

1. Insert date person is not available.
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. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
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EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Data Processor No. 1 (Assigned to TSC)	____	____	1. L. F. Womack Sr. Pwr. Prod. Eng. (Computer)			____ ____	____	____ ____
	____	____	*2. T. Black Pwr. Prod. Eng. (Computer)			____ ____	____	____ ____
	____	____	*3. D. A. Remington Pwr. Prod. Eng. (Computer)			____ ____	____	____ ____
	____	____	*4. J. D. Brady Pow. Prod. Eng. (Planning)			____ ____	____	____ ____
	____	____	*5 G. V. Johnson Engineering Trainee (Computer)			____ ____	____	____ ____
	____	____	*6. J. D. Lodge Power Prod. Eng.			____ ____	____	____ ____

1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

PG&E
Nuclear Plant Operations

DIABLO CANYON POWER PLANT
PROCEDURE ON-THE-SPOT CHANGE

Procedure No EP G-4 Rev. 3 Unit No. 1 ☐ 2 ☐ 1 & 2 ☒

Title Personnel Accountability and Assembly

Type of Change ☐ PERMANENT (green) ☒ TEMPORARY (yellow); Expiration Date Unit 2 Fuel Load

Requesting Department Emergency Planning Originator Steve Joiner, ext. 3154

Proposed Change: (Does this alter the intent of original procedure? ☐ Yes ☒ NO)
(Does it constitute an unreviewed safety/environmental question? ☐ YES ☒ NO)

This temporary change describes actions to be taken concerning Unit 2 if the site emergency signal is sounded.

1. Unit 2 Containment

   If the normal evacuation alarm is not in service for Unit 2 containment, then the compensatory measures are a manually operated alarm located on the 140' elevation and compressed air horns carried by "firewatch" patrol persons at each elevation. Should the site emergency signal be sounded, the Shift Foreman will dispatch an operator to immediately sound the alarm. In the event a fire or other emergency condition is detected by a "firewatch," that individual will sound his air horn. Upon hearing an air horn, "firewatch" personnel at all stations will sound air horns and the manual alarm will be activated.

Reason for Change:

Ensure all areas of Unit 2 are notified promptly of plant evacuation and/or fire in the event normal means are not available during construction.

Authorizations: William Vierra (Plant Management Staff) W. L. Overbeck (Plant Management Staff w/SRO Licen[illegible]) 4-26-84 Date

Is additional distribution required? ☐ YES ☒ NO
If so, originator must distribute to Control Room, Shift Foreman and QC.
List other initial distribution to Controlled Copy Holders of this procedure

Initial Distribution Made By:

Date Received by Document Control 4-26-84

PSRC Review and Plant Manager's approval no later than 5-10-84 Date above plus 14 days

Review Date

PSRC recommends approval ☐ Yes ☐ No

Plant Manager's approval ☐ N/A

Meeting Number ☐☐-☐☐☐

Approved To Perform On-The-Spot Change ☐ Additional Information ☐

Action Taken Remarks:

☐ Same as Original

Please see attached sheet

PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON POWER PLANT

PROCEDURE ON-THE-SPOT CHANGE
CONTINUATION SHEET

PROCEDURE NO. FP S-4 REV. 3

PROPOSED CHANGE/REASON FOR CHANGE:

2. Other Areas of Unit 2

All "firewatch" personnel are provided air horns to alert workers in high noise, welding and confined areas of a fire or other emergency condition. The Security Shift Supervisor will contact Construction Security to dispatch security personnel to Unit 2 if the site emergency signal is sounded. They will make a Unit 2 walkthrough to ensure all areas know to evacuate. These security officers are equipped with compressed air horns.

CURRENT

EMERGENCY PLAN

IMPLEMENTING PROCEDURES

TABLE OF CONTENTS

Volume 3B

05/21/84

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER EP RB-2
REVISION 1
DATE 4/6/84
PAGE 1 OF 5

TITLE EMERGENCY PROCEDURE
EMERGENCY EXPOSURE GUIDES

IMPORTANT TO SAFETY

APPROVED R. C. Thornberry PLANT MANAGER 4-23-84 DATE

SCOPE

This procedure addresses required authorization, guidance, and maximum exposure criteria in the event of a radiological emergency where it may be necessary for emergency workers to exceed established quarterly or annual exposure limits. This procedure and changes thereto requires PSRC review.

PROCEDURE

1. Authorization

   a. The approval of the Site Emergency Coordinator shall be obtained prior to undertaking any attempted rescue or corrective actions which could potentially or actually result in an individual exposure in excess of established quarterly or annual exposure limits. After the Recovery Manager arrives at the EOF, he shall also approve such actions.

   b. The Emergency Evaluations and Recovery Coordinator with the assistance of the Emergency Radiological Advisor will provide the Site Emergency Coordinator with an evaluation of conditions requiring the exposure.

   c. If time permits, prior to exposure, the Emergency Radiological Advisor shall complete Form 18-10554, Emergency Exposure Permit. The Site Emergency Coordinator and the volunteer(s) shall sign the Emergency Exposure Permit.

      Note: If the situation requires immediate action, Form 18-10554 may be completed following the exposure, although verbal authorization is required.

2. Volunteer Criteria

a. Personnel shall be volunteers or professional rescue personnel (e.g., firemen who "volunteer" by choice of employment).

b. Rescue personnel shall be broadly familiar with the consequences of any exposure received under emergency conditions.

c. Volunteers should be above age 45.

d. Women with a suspected or known pregnancy shall not take part in these actions.

3. Exposure Control

a. Individuals shall not enter any area where dose rates are unknown or beyond the range of instruments being used.

b. Personnel shall wear dosimeters appropriate for measurement of anticipated exposure levels. This shall include:

1) Two (2) direct-reading pencil dosimeters for whole body exposure: 1-100 or 50R range range. 1-5R range.

2) Film badge or thermoluminescent dosimeters to permanently record whole body exposures.

3) If anticipated extremity exposure exceeds 25% of quarterly extremity limit, whole body exposure rings shall be worn.

c. Protective clothing and/or respirators should be used as appropriate. In all cases where airborne contamination is anticipated, personnel shall be fitted with pressure/demand Self Contained Breathing Apparatus (SCBA) as a minimum.

d. Potassium Iodide (KI) tablets should be administered where high levels of radio-iodine are suspected. Refer to EP RB-3, "Stable Iodine Thyroid Blocking."

e. Administrative methods used during normal operations to minimize personnel exposure (such as Special Work Permits (SWPs) and ALARA measures) should remain in force to the extent consistent with timely rescue, corrective, and protective actions.

f. Exposures under these conditions should be limited to once in a lifetime.

4. Emergency Exposure Limits

a. Emergency Exposure Limits contained in Table 1 are defined for three categories: 1) Lifesaving actions; 2) Corrective or protective actions; and 3) Sampling under emergency conditions. Example emergency conditions in these categories may be defined as follows:

1) Lifesaving actions

a) Removal and/or rescue of injured personnel.

2) Corrective or protective actions

a) Providing first aid.

b) Providing ambulance service.

c) Providing medical treatment service.

d) Performing personnel decontamination.

e) Undertaking corrective action on plant equipment and systems.

3) Sampling under emergency conditions

a) Collection of in-plant airborne and liquid samples.

h) Use of the post-accident sampling system.

REFERENCES

1. NUREG-0737, November 1980.

2. NCRP Report No. 39, 1971.

3. "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," U.S.E.P.A., September 1975 (Revised June 1980).

SUPPORTING PROCEDURES

1. RB-3, Stable Iodine Thyroid Blocking

TABLES

1. Emergency Exposure Limits.

ATTACHMENTS

1. Form 18-10554 "Emergency Exposure Permit."

TABLE 1

EMERGENCY EXPOSURE GUIDES

	Sampling Under Accident Conditions(a)	Corrective or Protective Actions(c)	Lifesaving Actions(c)
Whole Body	5	25	75
Thyroid	15	125	No Limit(d)
Extremities	75	100(b)	200(b)

(a) NUREG-0737, November 1980.

(b) NCRP Report No. 39, 1971.

(c) EPA Protective Action Guides, June 1980.

(d) Thyroid exposure should be minimized to the extent feasible by the use of respiratory protection and/or thyroid prophylaxis. However, no upper limit is specified for lifesaving action since complete loss of thyroid function may be considered an acceptable risk for saving life.

18-10554 7/81 100

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY EXPOSURE PERMIT

DATE: TIME:

WORK LOCATION:

DEPT:

DESCRIPTION OF EMERGENCY:

SPECIAL HAZARDS:

SPECIAL INSTRUCTIONS:

MONITORING REQUIREMENTS:

1. Continuously by CARP _____
2. Periodically by CARP _____
3. By Individual _____
4. By Others _____

PROTECTIVE EQUIPMENT REQUIREMENTS

HEAD
- Surgeon's Cap
- Canvas Hood
- Waterproof Hood
- Face Shield
- Goggles

BODY
- Lab Coat
- One Pair Coveralls
- Two Pairs Coveralls
- No Personal Clothing
- Waterproof

HANDS
- Nonsparcres
- Surgeon's Gloves
- Heavy Duty Gloves

FEET
- Rubbers
- Canvas Booties
- Plastic Bags

RESPIRATION
- Full Facepiece, Filter
- Air Flow, Hood
- Air Flow, Full Facepiece
- Air Flow, Suit
- Self-Contained Air
- Half Facepiece, Filter

DOSIMETRY
- Film Badge, PY
- Neutron Film
- Gamma Pencil
- Finger Film
- Wrist Film
- C.P.
- Neutron Survey Meter
- Neutron Pencil
- Criticality Dosimeter

Personnel Online

RADIATION CONDITIONS AT START OF JOB

LOCATION	mrem/hr	dpm/cm^2	pCi/cc	type α, β, γ

VOLUNTEER EXPOSURE

Dosimeter Type	Total Exposure (Units)	Time-In	Time-Out	Total Time

AUTHENTICATION BY SHIFT EMERGENCY COORDINATOR: _____ (Print Name) _____ (Signature)

VOLUNTEER: _____ (Print Name) _____ (Title) _____ (Signature)

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER EP RB-14
REVISION 0
DATE 4/7/84
PAGE 1 OF 11

TITLE EMERGENCY PROCEDURE
CORE DAMAGE ASSESSMENT PROCEDURE

IMPORTANT TO SAFETY

APPROVED R. C. Thornberry PLANT MANAGER 4-27-84 DATE

SCOPE

This procedure describes the evaluation of the extent of core damage following an accident that can lead to inadequate core cooling. This procedure and revision thereto requires PSRC review.

DISCUSSION

Fuel damage resulting in the release of radioactive material can occur following a loss of coolant accident (LOCA) or following the loss of available heat sinks. These events, if uncorrected, can lead to localized or widespread overheating of reactor fuel and eventually to fuel rod cladding failure, and/or fuel melt. The description of plant parameters indicative of conditions that can lead to fuel failure or melt are provided in the Emergency Equipment Operation Procedures (OP Series).

This procedure supplements other emergency procedures by providing a methodology to determine the extent of core damage that may have resulted from an accident. This procedure does not replace procedures that are used to provide instructions regarding accident identification and/or mitigation or dose assessment although similar data and assessment is utilized in this procedure to determine the type and extent of fuel damage.

The objective of this procedure is the classification of fuel damage into one of four broad categories: (1) no fuel damage, (2) fuel cladding damage, (3) fuel overheat, and (4) fuel melt. Within the latter three categories, the procedure permits a rough estimate of damage as a proportion of core radionuclide inventories that have been released to the reactor coolant and/or containment atmosphere.

It provides a preliminary and a long term methodology for assessing core damage. The preliminary assessment utilizes rough evaluations of plant parameters such as reactor vessel level and reactor coolant temperatures to confirm that conditions exist which can lead to core damage, and quantifies the damage through the use of containment hydrogen levels and containment radiation levels. The long-term methodology requires that reactor coolant and containment air samples

be obtained and analyzed for radiochemical and chemical parameters. These results are then used, along with other plant parameters, to determine the extent of core damage. The preliminary assessment can yield quick initial results (within approximately 10 minutes). The long-term assessment could require up to three (3) hours to obtain sample analyses and further time for computation and evaluation of the results, but yields additional information necessary to distinguish between cladding failures, fuel overheat, and fuel melt.

PROCEDURE

1. Preliminary Assessment

   a. Corroborating Evidence for Core Damage

      If evaluation personnel in the TSC have indicated that conditions exist that could lead to inadequate core cooling (per EP OP-0 Appendix B), or ineffective ESF functioning under LOCA conditions (per EP OP-1, Appendix H), skip this section and proceed to Section b. Otherwise, determine the potential for fuel damage as described below:

Check the Appropriate Answer

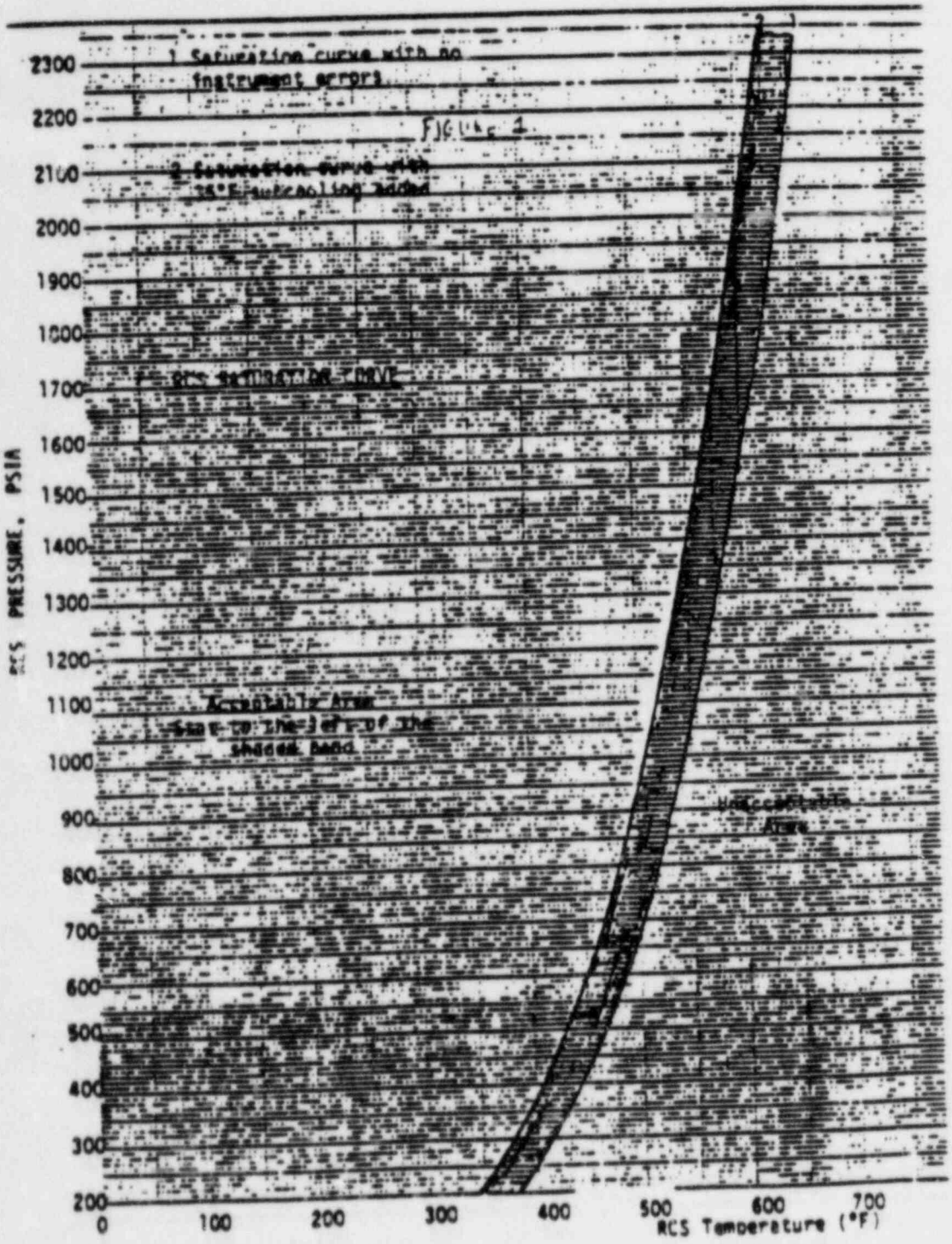
		YES	NO
1)	Are five or more core exit thermocouples temperatures greater than 1,200°F?	[ ]	___
2)	Can SI and/or charging flow to the RCS be verified?	___	[ ]
3)	Can AFW flow to the steam generators and CCW and ASW flow be verified?	___	[ ]
4)	Are RCS pressure and temperature within the "Acceptable Area" of subcooling as determined using Figure 1?	___	[ ]
5)	Are containment rad. monitors (RE-30 and 31) reading greater than 1R/hr.?	[ ]	___
6)	Is containment pressure greater than 1.3 psig?	[ ]	___

		YES	NO
7)	Is containment temperature greater than 120°F?	[ ]	___
8)	Is containment hydrogen level as indicated by monitors CEL-82 and CEL-83 up scale?	[ ]	___

If any of the boxes (as opposed to line spaces) for the previous questions were checked, then those conditions are potentially indicative of inadequate core cooling or a LOCA*, therefore, continue with this procedure. If none of the boxes were checked, continue monitoring the situation in accordance with applicable procedures.

*NOTE: In general, the more boxes that are checked, the greater the potential for inadequate core cooling. However, evaluation is necessary to determine the significance of this information. For conservatism, continue with this procedure if a full evaluation cannot be performed.

FIGURE 1


1 Saturation curve with no instrument errors
2 Saturation curve with 35°F subcooling added
RCS PRESSURE, PSIA
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
0
100
200
300
400
500
600
700
RCS Temperature (°F)

b. Preliminary Assessment of LOCA resulting in Core Damage

If loss of reactor coolant to the containment is not occurring, skip this section and proceed to Section 2.

1) Record time since reactor trip. _____ hrs (A)

2) Record reading of containment area monitor (RE-30). _____ R/hr (B)

3) Record reading of containment area monitor (RE-31). _____ R/hr (C)

4) Determine average area monitor reading [((B) + (C))/2]. _____ R/hr (D)

5) If the value of Item (D) is < 1 R/hr, then no core damage is indicated, otherwise compare (D) to calculated curves of area monitor response provided in Figures 2 and 3. Estimate the level of clad or core damage by interpolating between the curves provided for the time interval (A). Record the results as indicated.

NOTE: Interpolation can be accomplished by taking the reading (D) and dividing by the expected monitor reading for 100 percent core melt or GAP release at time (A), multiplied by 100.

Check One	
___	No damage
___	GAP ___%
___	Melt

FIGURE 2
EXPOSURE RATE VS POST ACCIDENT DECAY TIME
RE 30 AND 31 WITH GAP RELEASES

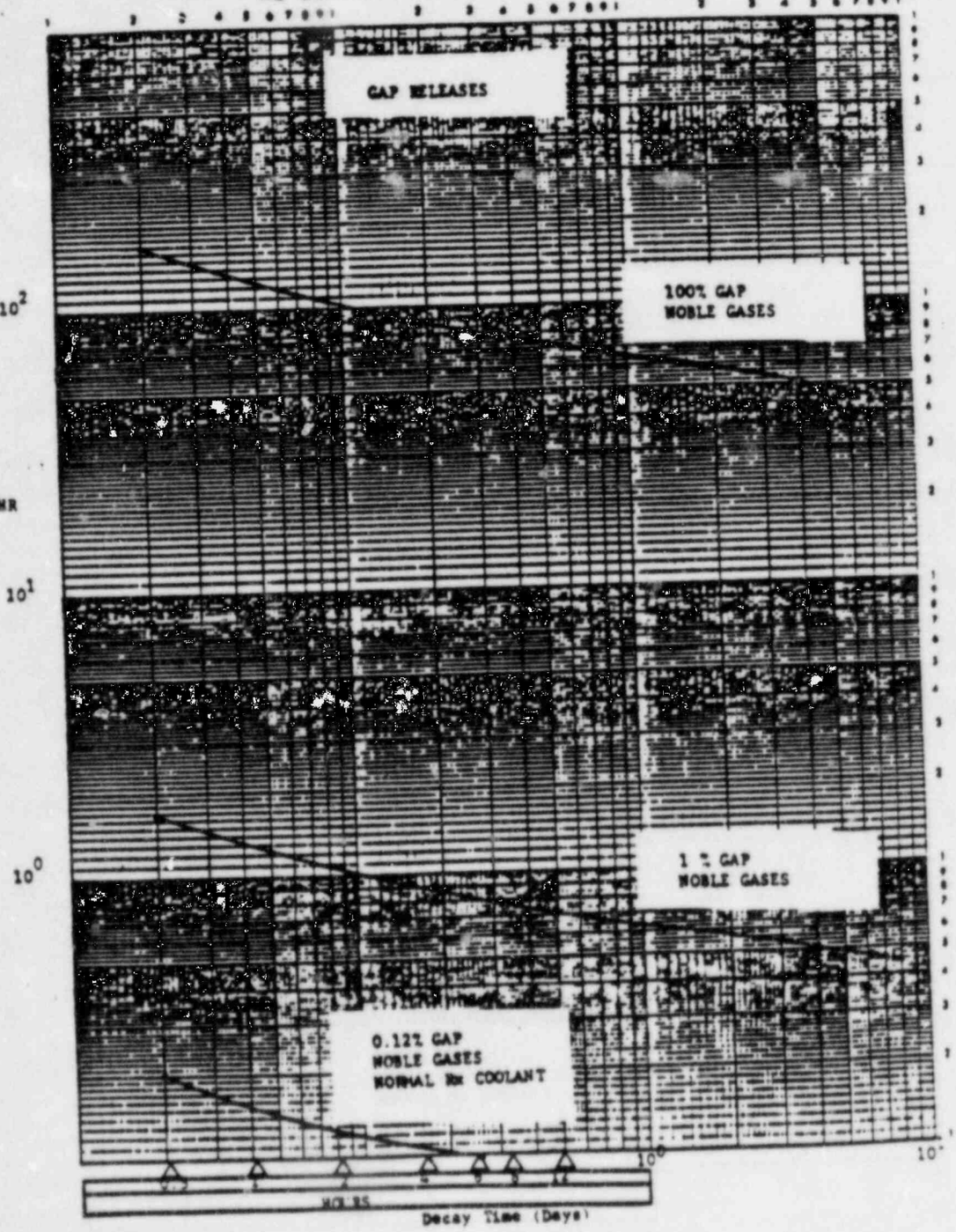
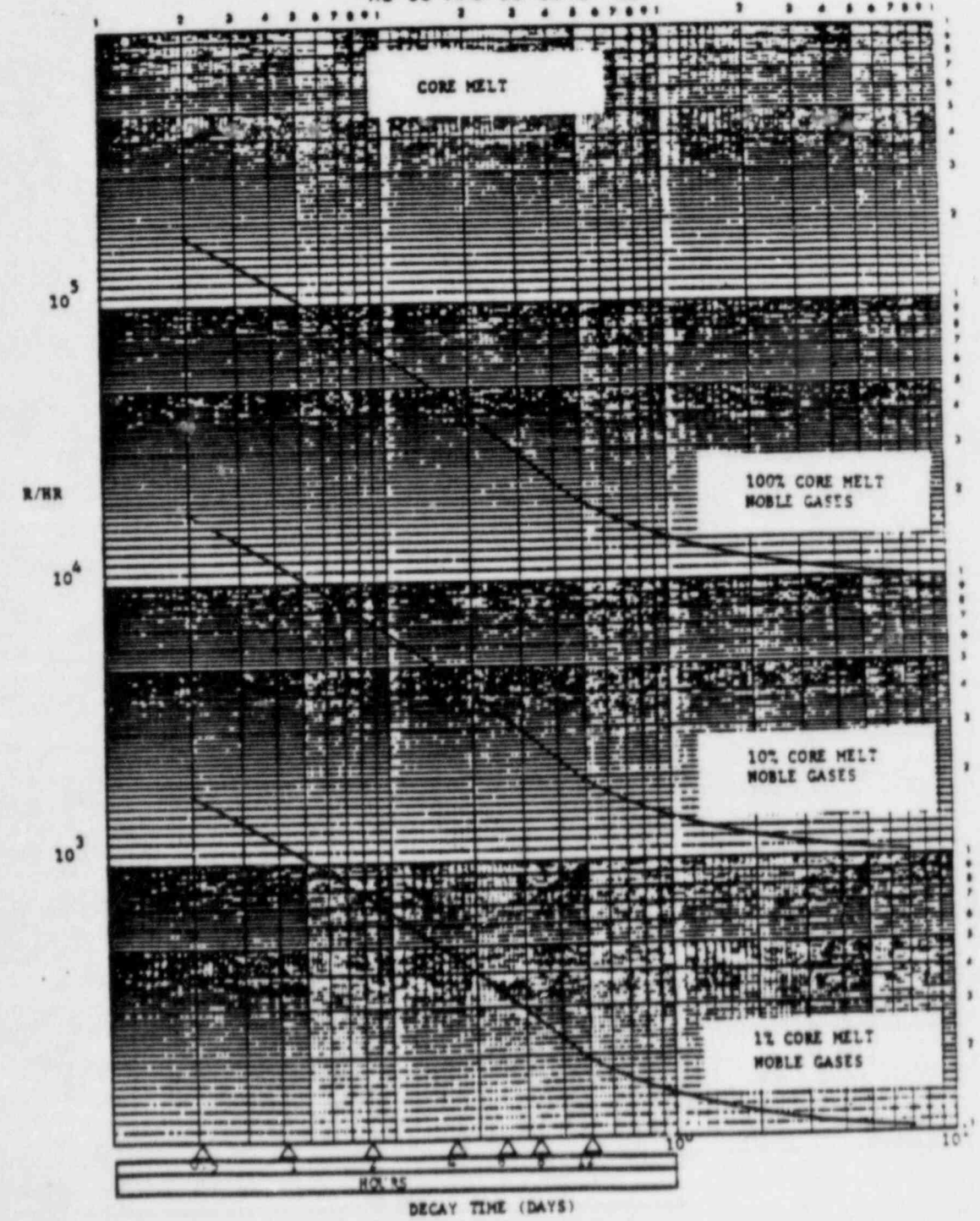


FIGURE 3
EXPOSURE RATE VS POST ACCIDENT DECAY TIME
RE 30 AND 31 CORE MELT



6) If no damage, or a GAP release is indicated, then corroborative results can be attempted using containment hydrogen levels. If core melt is indicated, proceed to Section 2 of this procedure.

7) Determine the average containment hydrogen concentration from containment hydrogen monitors CEL-82 and CEL-83. _____ % (E)

8) Compare Item (E) determined in Step 7 with the curve of expected H_2 concentration versus percent clad failure found in Figure 4. Estimate the percent clad damage and record the result.

Check One	
___	No damage
___	___% Clad failure

2. Long-Term Assessment

a. Request Sample

1) Request that the Emergency Radiological Advisor (ERA, assign a sampling team to collect a RCS and containment air sample from the post-accident sampling system (PASS). The following analyses shall be performed:

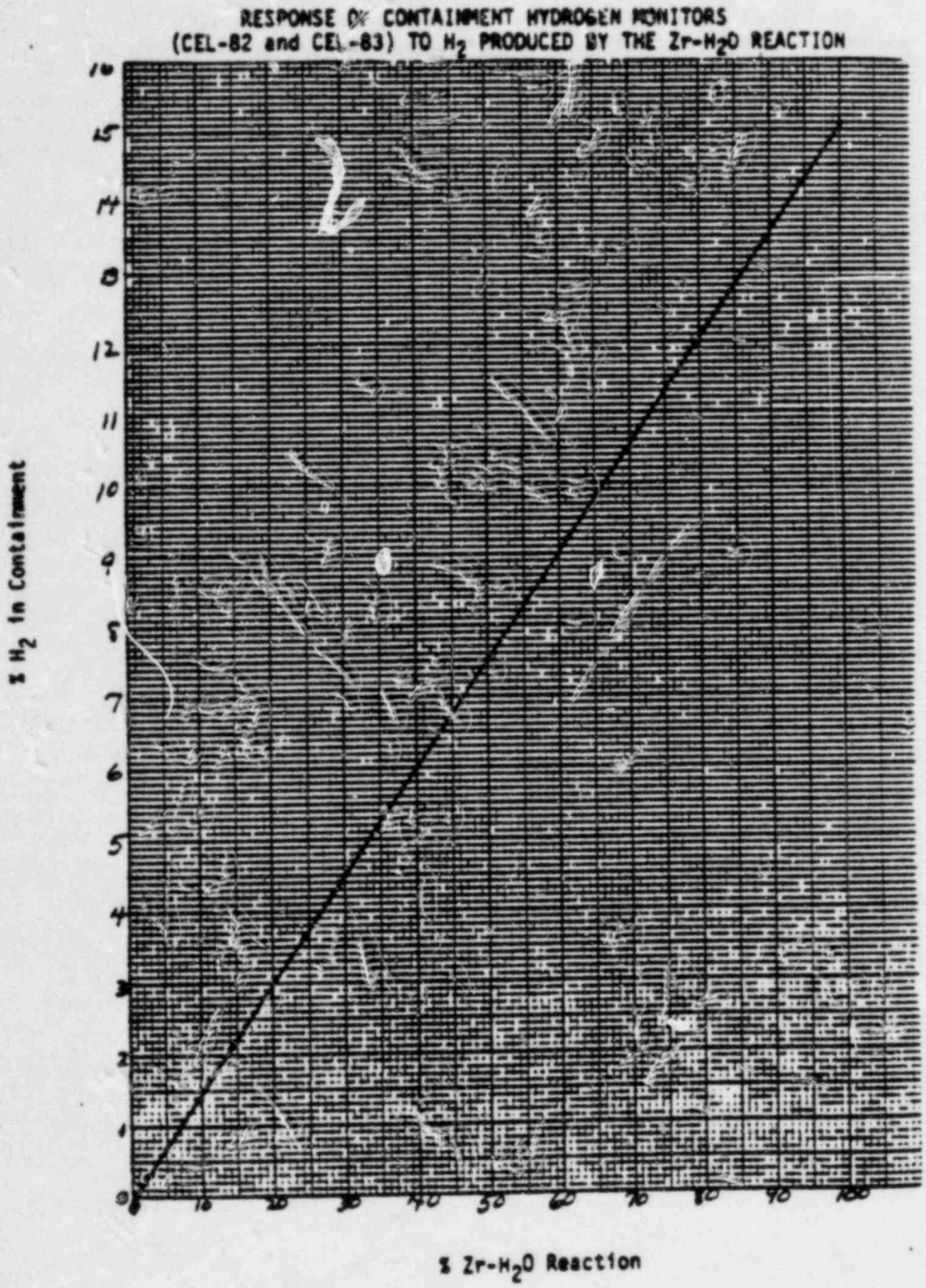
a) Gamma spectrometry on:
(1) RCS liquid and off-gas
(2) Containment air

†NOTE: Hydrogen levels in containment are a valid indicator of damage only within the first 24 hours of the accident, assuming that the hydrogen recombiners are not operating. Since complex mechanisms dictate the amount of H_2 and radioactive materials released to containment it is not possible to predict which assessment of clad damage is more accurate. If results of damage assessment using the rad. monitors and the H_2 monitors differ, try to utilize corroborating data from RVLIS, etc., to select the most representative assessment of damage. If resolution cannot be obtained, use the highest estimated level of clad failure.

b) H_2 levels on:
(1) Containment air

Request that the sample analysis be decay corrected back to the time of sampling.

FIGURE 4


RESPONSE OF CONTAINMENT HYDROGEN MONITORS
(CEL-82 and CEL-83) TO H_2 PRODUCED BY THE Zr-H_2O REACTION
% H_2 in Containment
% Zr-H_2O Reaction
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
10
20
30
40
50
60
70
80
90
100

2) Await sample analyses. This may take up to 3 hours. In the interim, continue to assess core damage via the techniques provided in Part 1 of this procedure. When sample analyses are available, proceed to Section 2.2.

b. Analysis of Sample Results

1) Complete Attachment 1, "Water Entrained Inventory Worksheet."

2) Complete Attachment 2, "Airborne Inventory Worksheet."

3) If reactor power for the 30 days prior to shutdown remained relatively constant (within the range of ±20 percent) and the average power level is at least 80 percent, proceed to Attachment 3 and determine the power corrected source inventories. Otherwise, complete Attachment 4 to correct source inventories for a variable power history.

4) Complete Attachment 5 to determine percentage of core or GAP activity released.

5) Refer to Attachment 6 to determine what type of failure (no damage, clad, overtemp, melt) is occurring (if any).

6) Report results determined by this procedure to the individual making the request for a core damage assessment.

7) Continue to monitor the situation by utilizing this procedure as necessary.

ATTACHMENTS

1. Water Entrained Inventory Worksheet
2. Airborne Inventory Worksheet
3. Calculation of Power-Corrected Source Inventories for Constant Power Levels
4. Source Inventory Power Correction for Variable Power History
5. Comparison of Expected and Actual Source Inventories
6. Qualitative Assessment

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: WATER ENTRAINED INVENTORY WORKSHEET

ATTACHMENT 1

1. Check the appropriate sample type:

   ___ RCS ___ RHR ___ Reactor Cavity Sump (A)

2. Convert the elapsed time since reactor trip and the collection of the RCS sample to hours:

   _____ hr (B)

3. If the sample is a RCS sample, record the following information:

   RCS Temperature (Tave) _____ °F (C)

   RCS Pressure _____ psia (D)

   RCS Density Correction Factor (Figure 5) _____ (E)

4. Last RWST volume prior to accident _____ gal (F)

5. Current RWST volume _____ gal (G)

6. Volume of RWST injected ((F)-(G)) = _____ gal (H)

7. Determine which ECCS volumes have been released into the RCS or containment, and determine the total volume in the Containment Sump:

Total Volume	Actual Used in RCS
(1) RWST Volume = (H) x 3,785 $\frac{cc}{Gal}$ =	_____ cc (I)
(2) Each Accumulator = 4.28×10^7 cc (there are four accumulators)	_____ cc (J)
(3) RCS = 3.56×10^8 cc	3.56×10^8 cc (K)
(4) Total Volume ((I) + (J) + (K))	_____ cc (L)

8. Enter the values of (E) and (L) on the next page and calculate the total water entrained inventory as indicated.

9. Proceed to Step 2.2.1 of this procedure.

TITLE: WATER ENTRAINED INVENTORY WORKSHEET

ATTACHMENT 1 (Continued)

	A	B[a]	C[b]
Isotope	Measured Liquid† Sample Activity (μCi/cc)	Activity at RCS Conditions (μCi/cc)	Total Water Entrained Inventory (Ci)
Kr-87			
Xe-133			
I-131			
I-132			
Te-132			
Cs-134			
Ba-140			
La-140			

[a] B = A x (E) _____

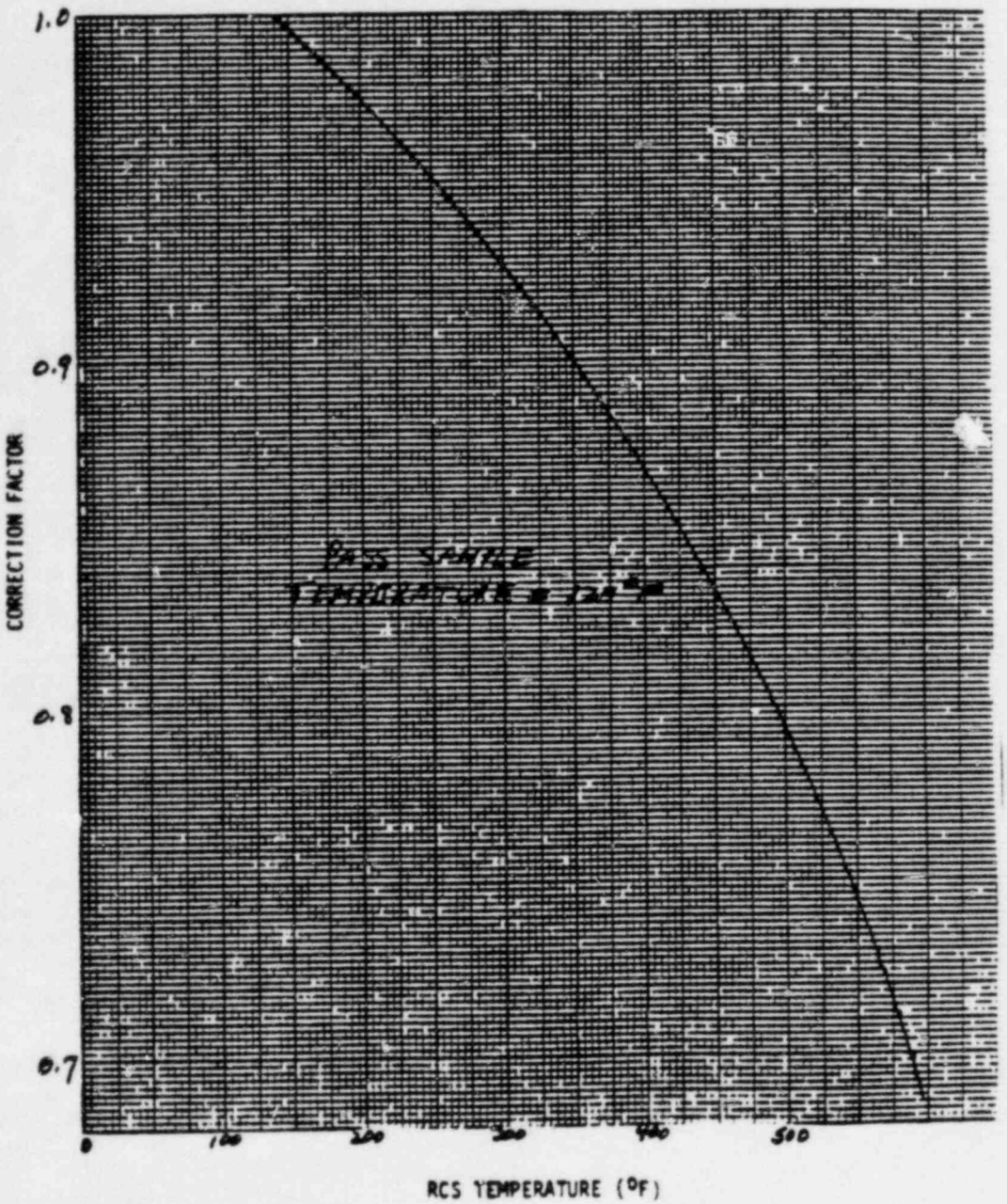
[b] C = B x (L) _____ x 10^{-6}

†Liquid is defined as the total activity from the RCS sample, including any off gases.

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2
FIGURE 5

TITLE: WATER ENTRAINED INVENTORY WORKSHEET

PASS LIQUID SAMPLE DENSITY CORRECTION



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DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: AIRBORNE INVENTORY WORKSHEET

ATTACHMENT 2

1. Record the elapsed decay time since reactor trip and the collections of the containment air sample in hours:

_____ hr (A)

2. Record the following information:

Containment Temperature _____ °F (B)
Containment Pressure _____ psig (C)
(C) + 14.7 = _____ psia (D)

3. Calculate the Containment atmosphere Pressure and Temperature (P-T) correction factor using the following formula:

$$\text{P-T Correction Factor} = \frac{D}{14.7} \cdot \frac{(530)}{(B + 460)}$$

Where 530 is room temperature on Rankine Scale.

P-T Correction Factor _____ (E)

4. Record the containment airborne sample activities in Column A on page 2 of this attachment. (NOTE: The containment activities reported by the sampling teams are at room temperature and pressure.

5. Adjust the reported activities to the conditions of temperature and pressure found in the containment by multiplying the values in Column A by the P-T correction factor, (E) and recording the result in Column B.

6. Calculate the total airborne inventory of the nuclides of interest by multiplying all the values in Column B by 7.36E+04. (This is the Containment volume of 7.36E+10cc and the conversion factor of 10^{-6} Ci/uCi.) The results should be recorded in Column C.

TITLE: AIRBORNE INVENTORY WORKSHEET

ATTACHMENT 2 (Continued)

	A	B[a]	C[b]
Nuclide	Measured Sample Activity (uCi/cc)	Activity at Containment Conditions (uCi/cc)	Total Airborne Inventory (Ci)
Kr-87			
Xe-133			
I-131			
I-132			

[a] B = A x (E)

[b] C = B x 7.36E+04

7. Proceed to Step 2.b.3)

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DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: CALCULATION OF POWER-CORRECTED SOURCE INVENTORIES FOR CONSTANT POWER LEVELS

ATTACHMENT 3

1. Estimate and record the average power for the last 30 days. (This form is only to be used when the power level has averaged at least 80 percent and has remained relatively constant [within the range of ±20 percent in the last 30 days]. If the power level has not been relatively constant, use Attachment 4. _____%

2. Multiply the source inventory values listed in Column 1 by the value on Line 1, and record the result in Column 2.

3. Enter the corrected values.

NUCLIDE	1 EQUILIBRIUM SOURCE (Ci)	2 CORRECTED SOURCE (Ci)
GAP INVENTORY		
Kr-87	3.9E+4	
Xe-133	1.3E+6	
I-131	8.0E+5	
I-132	1.3E+5	
FUEL PELLET INVENTORY		
Kr-87	5.9E+6	
Xe-133	1.9E+8	
Te-132	1.4E+8	
Cs-134	3.1E+6	
Ba-140	1.6E+8	
La-140	1.8E+9	
I-131	9.7E+7	
I-132	1.4E+8	

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DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: SOURCE INVENTORY POWER CORRECTION FOR VARIABLE POWER HISTORY

ATTACHMENT 4

When the power level has not been relatively constant at 80 percent for the last 30 days, nuclides of interest have not had enough time to build up to equilibrium levels.

In this case, the effects of each significant power change must be taken into account. The formula to be used is:

$$PF_i = \Sigma_j F_j \, (1-e^{-\lambda_i \, t_{1j}}) e^{-\lambda_i \, t_{2j}}$$

Where:

PF_i = 30-day power factor for Nuclide i

F_j = fractional power level for time Period j

λ_i = nuclear decay constant for Nuclide i

t_{1j} = length of time Period j

t_{2j} = time from end of time Period j to end of 30-day period.

The calculation of power factor must be repeated for every nuclide.

The power factor determined in this way should be recorded in Column B of this from. This power factor should then be multiplied by the value in Column C with the result recorded in Column D.

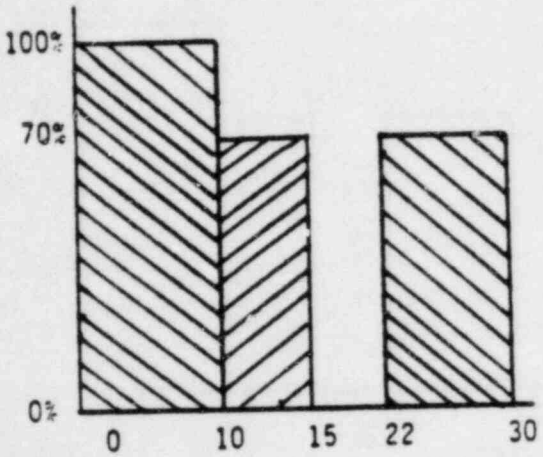
Sample power factor calculation:

The Plant has operated for the 30 days prior to the accident with the following power history:

100-percent power for 10 days
70-percent power for 5 days
0-percent power for 7 days
70-percent power for 8 days

TITLE: SOURCE INVENTORY POWER CORRECTION FOR VARIABLE POWER HISTORY

ATTACHMENT 4 (Continued)



30 Day Power History
Prior to Accident

For time Period 1,

$F_1 = 1.0$, $t_{11} = 10$ days, $t_{21} = 20$ days

For time Period 2,

$F_2 = 0.7$, $t_{12} = 5$ days, $t_{22} = 15$ days

For time Period 3,

$F_3 = 0.0$, $t_{13} = 7$ days, $t_{23} = 8$ days

For time Period 4,

$F_4 = 0.7$, $t_{14} = 8$ days, $t_{24} = 0$ days

The equation for Nuclide i would be:

$$PF_i = [1.0\ (1-e^{-\lambda_i\ (10\ \text{days})})e^{-\lambda_i\ (20\ \text{days})}] + [0.7\ (1-e^{-\lambda_i\ (5\ \text{days})})e^{-\lambda_i\ (15\ \text{days})}] + [0.0\ (1-e^{-\lambda_i\ (7\ \text{days})})e^{-\lambda_i\ (8\ \text{days})}] + [0.7\ (1-e^{-\lambda_i\ (8\ \text{days})})e^{-\lambda_i\ (0\ \text{days})}]$$

TITLE: SOURCE INVENTORY POWER CORRECTION FOR VARIABLE POWER HISTORY

ATTACHMENT 4 (Continued)

CORRECTION FOR VARIABLE POWER LEVEL

	A	B	C	D
NUCLIDE	Decay Constant (day^{-1})	Power Correction Factor (PF_i)	Equilibrium Source Inventory (Ci)	Corrected Source Inventory (Ci)
Gap Inventory				
Kr-87	13.10		3.9E+4	
Xe-133	0.13		1.3E+6	
I-131	$8.62X10^{-2}$		8.0E+5	
I-132	6.94		1.3E+5	
Fuel Pellet Inventory				
Kr-87	13.10		5.9E+7	
Xe-133	0.13		1.9E+8	
Te-132	$2.13X10^{-1}$		1.4E+8	
Cs-134	$9.21X10^{-4}$		3.1E+6	
Ba-140	$5.42X10^{-2}$		1.6E+8	
La-140	$4.15X10^{-1}$		1.8E+E	
I-131	$8.62X10^{-2}$		9.7E+7	
I-132	6.94		1.4E+8	

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DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: COMPARISON OF EXPECTED AND ACTUAL SOURCE INVENTORIES

ATTACHMENT 5

1. Copy both the total waterborne and airborne nuclide inventories into Columns 1 and 2 of the attached Form.

2. Add Columns 1 and 2 to get the total release inventory of each nuclide of interest, and record the result in Column 3.

3. Copy the expected source inventory into Column 4 from Attachment 3 or 4.

4. For each nuclide, divide the value in Column 3 by the corresponding value in Column 4, and record the result in Column 5.

5. Go to Section 2.2 Step 5.

TITLE: COMPARISON OF EXPECTED AND ACTUAL SOURCE INVENTORIES

ATTACHMENT 5

Isotope	1 Total Waterborne (Attachment 1)	2 Total Airborne (Attachment 2)	3 Total Released Inventory (Ci)	4 Expected Source Inventory (Ci) (Attachment 3 or 4)	5 Percent Released
Gas Gap Inventory					
Kr-87					
Xe-133					
I-131					
I-132					
				Average %	
Fuel Pellet Inventory					
Kr-87					
Xe-133					
I-131					*
I-132					*
Cs-134					*
Te-132					*
Ba-140					
La-140					
				Average %	

*Do not use for calculating "average percent". Use only for qualitative assessment on Attachment 6.

Check One:
___ No damage
___ GAP release
___ Core melt

TITLE: QUALITATIVE ASSESSMENT

ATTACHMENT 6

1. For each nuclide listed on the attached worksheet, check the box which corresponds to the inventory percentage found on attachment 5. Circle the applicable iodine ratio.

2. To best determine the category of damage, concentrate on the presence or absence of key nuclides (e.g., Te, Cs, Ba, La).

3. The general location of the marks should give an indication of the type of core damage.

4. Enter the type of damage that has been determined on Attachment 5, and proceed to step 2.2.6.

NOTE: If Ag-110m was found in any of the samples, it is a good indicator of fuel melt (Ag is from the control rods).

TITLE: QUALITATIVE ASSESSMENT

ATTACHMENT 6 (Continued)
GRAPHIC DAMAGE ASSESSMENT WORKSHEET

	No Damage <0.12%	GAP Release <10%*	GAP Release 10-50%	GAP Release >50%	Fuel Overheat <10%*	Fuel Overheat 10-50%	Fuel Overheat >50%	Fuel Melt <10%*	Fuel Melt 10-50%	Fuel Melt >50%
Kr-87										
Xe-133										
I-131										
I-132										
Iodine Ratio		$\frac{I\text{-}132}{I\text{-}131}$ <0.2			$0.2 \leq \frac{I\text{-}132}{I\text{-}131} \leq 1.5$			$\frac{I\text{-}132}{I\text{-}131} \geq 1.5$		
Cs-134										
Te-132										
Ba-140										
La-140										

*Do not check if below 0.12%.